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Using Cash, Futures, and Options Contracts in the Farm Business

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Abstract

A contract is an agreement between a buyer and a seller that specifies terms for future delivery of and payment for a product, asset, or service. Contracting enables farmers to reduce income uncertainty by assuring prices and outlets for their crops and livestock before the products are actually delivered. This report describes some of the contracting alternatives available to farmers, the factors to be considered in choosing among the different types of contracts, and the major advantages and disadvantages of each alternative. For example, the contracts most widely used by farmers are with local buyers. Such contracts assure farmers' outlets and set conditions for delivery. Some farmers use the highly standardized contracts traded on futures exchanges to temporarily set approximate prices for their products or inputs, pending actual sales to or purchases from local merchants or processors. Commodity options contracts, which are also highly standardized and traded on exchanges, can be used to set approximate lower or upper bounds on prices for commodities to be sold or bought later. The farmer's choice of contracts depends on the commodities produced or used as inputs, and the farmer's financial situation and risk preferences.

Keywords: Contracting, futures trading, commodity options, forward pricing, formula pricing, price risk, price instability.

Preface

Many farmers wait until delivery time to arrange for outlets and prices for their crops or livestock. This leaves farmers exposed to uncertainties about prices, outlets, and returns throughout the growing, storage, or feeding period. A serious price decline or loss of an outlet can be devastating to a farmer who is highly specialized or makes heavy use of borrowed capital. To help protect against such contingencies, farmers may wish to reexamine the range of contracting and forward pricing opportunities available to them.

This report describes different types of contracts and forward pricing arrangements, the factors to be considered in choosing among them, and the major pitfalls involved. For simplicity, the discussion focuses on forward selling of farm outputs, but the principles are the same for forward purchasing of farm inputs. Further information is available from various government, university, and private sources, especially pertaining to particular commodities and farming conditions.

This report supersedes Farmers' Use of Cash Forward Contracts, Futures Contracts, and Commodity Options (AER-533), issued in May 1985, by providing updated information, discussing certain aspects of contracting in greater depth, and giving added attention to commodity options.

Acknowledgments

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Risk Management Through Contracting

Many farmers can reduce income risks by using cash, futures, or options contracts.

A contract is an agreement between a buyer and a seller that specifies terms for future delivery of and payment for a product, asset, or service. Contracting enables farmers to reduce income uncertainty by assuring prices and outlets for their crops and livestock before the products are actually delivered. This report describes some of the contracting alternatives available to farmers, the factors to be considered in choosing among the different types of contracts, and the major advantages and disadvantages of each alternative. For example, the most widely used contracts by farmers are with local buyers. Such contracts assure farmers' outlets and set conditions for delivery. Some farmers use the highly standardized contracts traded on futures exchanges to temporarily set approximate prices for their products or inputs, pending actual sales to or purchases from local merchants or processors. Commodity options contracts, which are also highly standardized and traded on exchanges, can be used to set approximate lower or upper bounds on prices for commodities to be sold or bought later. The farmer's choice of contracts depends on the commodities produced or used as inputs, and the farmer's financial situation and risk preferences.

Contracting has potential pitfalls. The forced buyback of contracts at a loss after a crop failure is one of the greatest dangers. To reduce chances of such an event, only a fraction of an expected crop should be forward priced through contracts until output is assured. Other potential pitfalls of contracting include buyers' defaulting on cash contracts and unanticipated exposure to price risk when a farmer's futures position is eliminated due to inability or failure to meet a broker's call for additional money to cover losses on the futures.

Most farmer contracting is through cash contracts with local buyers. Only cash contracts can assure farmers' outlets for their crops or livestock. Such contracts can be tailored closely to the needs of individual farmers and can spare the farmer from concern about cash-futures price relationships and brokers' calls for money to cover futures losses. But in some localities, relatively few buyers offer cash contracts, and the competitiveness of the contract prices and terms offered by buyers may require evaluation. Moreover, the possibility of default by the buyer must be considered when a farmer enters a cash contract.

Cash contracts may set a firm price or may leave price to be determined by formula based on a cash or futures price to be observed at a later date. The latter is called deferred pricing, and allows the farmer to assure an outlet for a commodity being produced or stored while speculating on a price increase. A problem with deferred pricing is finding a base price that closely approximates the value of the commodity specified in the contract and that reflects competitive valuations.

Some contracts not only set conditions for delivery of a product, but also prescribe production methods or call for the buyer to provide production inputs. These so-called production contracts are widely used for such commodities as processing vegetables, broilers, and eggs, and are becoming more important in hog production. Production contracts generally involve turning over some decisionmaking and control of the production operation to the integrator (processor) and often cover more than 1 year, particularly when special facilities are required.

Futures markets are an important source of price information for farmers, but only a small percentage of farmers directly trade futures. Farmers buy and sell futures through commodity brokers. By hedging, that is, selling or buying futures contracts as a temporary substitute for anticipated cash sales or purchases, farmers as well as merchants or processors can quickly lock in approximate prices for their products or inputs. Because the standard terms of futures contracts generally do not exactly match the product that the hedger has for sale or wants to buy, hedgers usually eliminate their futures positions with opposite trades before delivery is required, as they sell or buy on the cash market for actual delivery.

Considerable knowledge of the workings of futures markets is needed to hedge effectively. Hedging exposes the farmer to uncertainty about the cash-futures price difference, referred to as "basis." If they do not want to risk having their futures positions eliminated, hedgers must be financially prepared to make up any losses on their futures positions through payments to their brokers.

Buying a commodity option provides the right, without obligation, to buy or sell a futures contract at a specified price during a specified time interval.

Commodity options are potentially useful to farmers who want to assure minimum prices for outputs, or maximum prices for inputs, while retaining possibilities to gain from favorable price changes. Options, like futures, are purchased through commodity brokers. One must pay an up-front premium to buy an option, but the option buyer is not subject to calls for additional margin payments, as is the futures trader.

To limit risks, one should generally enter contracts when commitments are made to a particular enterprise, when output becomes more certain, or when price expectations change. Appropriate times to contract are when production loans are arranged, inputs are purchased, or a crop reaches a stage of development that makes yields more certain. Events that indicate a change in demand and supply may also prompt forward pricing decisions.

Good management requires that forward contracting decisions be coordinated with other production and marketing decisions. Suggested steps in planning for an enterprise include:

1. Identify the production, borrowing, contracting, and spot-selling alternatives available.
2. Estimate costs and returns using forward price information.
3. Evaluate risks and risk-bearing capacity.
4. Plan production, borrowing, and marketing activities.

The plan is implemented by first arranging loans, then purchasing inputs and contracting outputs. Later, the farmer may wish to adjust the amounts contracted in response to new information about price and yield prospects.

Many sources of information are available for farmers to use in determining when, how, and how much to sell. These sources include reports of the U.S. Department of Agriculture, State experiment stations, the Cooperative Federal-State Extension Service, brokerage firms, and commodity exchanges.

The Contracting Alternatives Available to Farmers

Farmers need to understand the features of different types of contracts to determine which type best meets their needs.

Buying and selling decisions are among the most important decisions that farmers make. Selling prospective outputs before they are produced and purchasing inputs before they are used are ways of reducing the uncertainties involved in crop and livestock production. As long as prices fluctuate, farmers will want to consider using cash, futures, or options contracts to help assure returns on their investments.

A contract is an agreement between a buyer and a seller that specifies terms for future delivery of and payment for a product, asset, or service. Contracting methods range from simple oral understandings between buyers and sellers to highly standardized futures trading and options trading. This report discusses the principles of contracting and forward pricing farm products and inputs. It suggests what might be workable and desirable in different farming situations and identifies potential problems.

Here are some of the questions a farmer might consider when making commitments to produce crops or livestock:

How can I assure a price for a product before making a large investment in producing it?

How can I determine whether a price offer is adequate?

Should I forward sell if crop prospects seem uncertain?

If forward selling reduces uncertainty of return, does it also lower the average level of return?

What problems might I encounter if I forward sell?

Each farmer's contracting and forward pricing needs are unique. This report can help farmers find the combination of contracting tools that best meets their individual needs. The report does not cover other methods of managing farming risks, such as enterprise

diversification, crop insurance, and enrollment in Federal farm programs.

The contracting alternatives available to farmers fall into three major categories: cash contracts with local buyers, futures contracts, and commodity options contracts. Each type of contract has features that fit farmers' particular needs.

A cash contract is an agreement negotiated individually between a buyer and a seller outside the rules and guarantees of an organized exchange. Such contracts explicitly or implicitly set quantity, grade, and place and time of delivery. Cash contracts either set price or provide a formula for determining price later based on market price quotations. Some cash contracts also prescribe production practices or provide for the buyer to supply inputs. The latter are called production contracts and are widely used for specialized or perishable products, such as vegetables for processing, broilers, and eggs.

Futures contracts are standardized contracts traded under the rules of an organized exchange. For example, all wheat futures contracts traded under the rules of the Kansas City Board of Trade are identical in size, grade, and place of delivery requirements. Nonmembers trade through brokers, who are exchange members. Since delivery and payment do not occur until contracts mature, traders are required to deposit money in margin accounts with their respective brokers to guarantee performance on their contracts.

A commodity option is a right, for a limited time, to sell or buy a futures contract at a specific price, called the strike price. A put option is a right to sell; a call option is a right to buy. The buyer or option holder pays a premium for this right. The option holder is not obligated to exercise the option and is not subject to calls for additional margin money, as is the holder of a futures position. Trading in options on domestic agricultural products has been allowed since 1984. Options are traded on most agricultural futures contracts.

Potential Gains

Contracting can help farmers assure prices or outlets.

To contract is to arrange terms now for a trade (delivery of a product and payment) that is to occur in the future. Contracting allows farmers to set prices and delivery terms for anticipated outputs and inputs as production commitments are made or when prices are favorable. Farmers may consider contracting on numerous occasions, but particularly when borrowing money for production costs, purchasing inputs, planting or putting livestock on feed, when crop yield becomes more certain, or when economic developments suggest a change in forthcoming price levels. In many cases, contracting enables the farmer to reduce income uncertainty by assuring a price, an outlet, or both. Profiting through more timely selling or buying may also be an objective. Table 1 summarizes the purposes that alternative types of contracts serve.

Assuring Price

Variation in output and shifts in domestic and foreign demand make farm prices highly variable. By forward selling with cash or futures contracts or by buying options, farmers can reduce exposure to such price variability. Forward selling can reduce the likelihood that a price drop would leave a farmer with inadequate income or would jeopardize repaying creditors. Indeed, lenders may encourage or require farmers to forward price part of their expected output as a condition for loans.

Existing types of contracts provide farmers wide time intervals for setting prices on their inputs and outputs. Many local farm product buyers offer farmers

contracts throughout the growing season or up to a year before delivery. Futures contracts allow farmers to price prospective outputs up to 6 or more months before crops are planted or livestock are put on feed. Once the price is assured, the farmer can devote energies to other matters without worrying about price uncertainties. When more than one crop can be grown, however, the farmer may want to retain flexibility to change the crop by waiting until near planting time to contract.

Futures and options trading generates price information that farmers can use to determine what and how much to produce and store. Futures prices reflect the best judgments of informed traders about prospective spot prices at delivery time for products that meet delivery requirements. By adjusting the products grown and amounts of inputs used based on observed futures prices, farmers can make better production decisions and can potentially increase profits over time.

Assuring Outlets

More farmers use cash contracts than use futures and options contracts. Cash contracts assure outlets for farmers and supplies for buyers, and enable farmers and buyers to coordinate plans for production and delivery. Sometimes contracts prescribe delivery terms and/or production processes without setting the price. If the price is not specified, a formula typically is agreed on for setting the price relative to a cash or futures price to be observed later. This assures an

Table 1--Purposes served by alternative methods of contracting

Purpose	Method of contracting				
	Sell futures	Buy put options	Cash contracts		
			Fixed-price	Minimum-price	Deferred-price
Assure price	X	X	X	X	
Assure outlets			X	X	X
Seek profits from price increases		X		X	X

outlet for the farmer and a source of supply for the buyer, but leaves the farmer with price uncertainty.

Assuring outlets is important for all farm products, particularly for perishables, such as eggs and vegetables for processing. Many grain and cotton producers enter contracts to assure storage space at harvest. Some of these contracts allow prices to be determined based on futures quotations to be observed later.

Forward contracts call for delivery of either a commodity or a service. Sales of farming services with a production contract (for example, growing a crop, raising poultry, feeding livestock) for an agreed return have become prominent with the advent of modern farming methods and heavy capital requirements. Some agreements gear the payments to yield levels, commodity prices, and other performance factors.

Profiting from Anticipated Price Changes

Farmers often hold views about prospective changes in the prices of the commodities that they produce or buy. Contracting enables farmers to act on such views to seek higher returns. For example, a farmer may

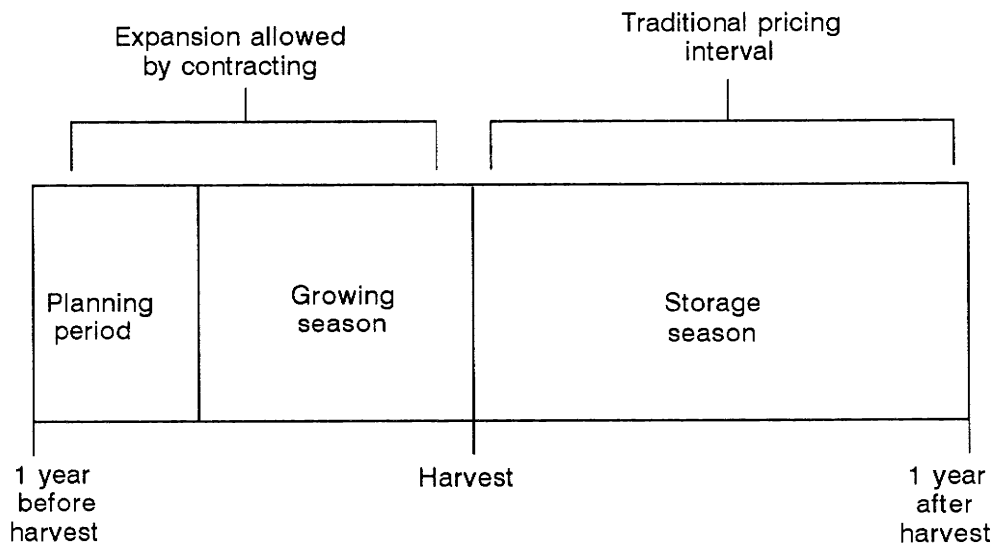
contract early to set price ahead of an anticipated price decline, or wait to set price after an expected price increase.

Figure 1 illustrates how contracting extends the interval for pricing storable crops. Without contracting, the farmer can sell at harvest or possibly store and sell up to a year later if storage facilities are available. With contracting, the price can be set much earlier, during the growing season or even before planting. With appropriate modifications, the same type of diagram applies to other enterprises. The storage phase is absent for perishable crops and livestock products. There are no annual planning and planting cycles for perennial crops, but forward contracting is possible throughout the dormant and growing periods.

Futures and options contracts provide farmers great flexibility to take advantage of anticipated price changes when pricing their products. In these markets, the farmer is not necessarily limited by the quantity of the product being produced and can either buy or sell depending on price expectations. This has led some farmers to take highly speculative positions where the risks are great.

Figure 1

How contracting can expand the interval for pricing crops



Potential Pitfalls

Farmers may lose by contracting if yields fail, buyers default on cash contracts, or futures contracts are used imprudently.

While contracting generally reduces risks, it is not risk-free (table 2). Yield shortfalls sometimes force farmers to buy back futures or cash contracts at a loss. Inability to meet a margin call can result in liquidation of a futures position and exposure to price risk at a critical time. A futures or options position may provide less price protection than expected due to an abnormal cash-futures price relationship at the end of the hedging period. And buyers occasionally default on cash forward contracts.

Added Losses When Yields Fail

Output uncertainty is negligible in grain and oilseed storage and of relatively small concern in livestock feeding, but it is a major consideration in crop growing. Crop yield shortfalls can result from weather, insects, disease, or other unpredictable events. For example, some farmers who sold forward corn and soybeans prior to the onset of the drought in 1988 were unable to deliver as much as contracted and had to buy back contracts at an elevated price. Yield uncertainty makes forward selling less effective in reducing revenue risk, and usually means that only part of a prospective crop should be priced forward before yield is assured.

The amount of a crop to sell forward depends on the variability of the farmer's yield and how closely the farmer's yield varies with national yields. Farmers whose crops fail in a year of generally poor crops and resulting high prices may have to buy back their contracts at a loss. If the crop failure is an isolated case, however, the market price may not be affected, and the farmer might buy out of the contract without loss. Some farmers use crop insurance combined with cash, futures, or options contracts to control overall risks. (See "Forward Pricing Growing Crops" in the Making Contracting Decisions section for more discussion of how much to sell before harvest.)

Farmers who enter minimum-price contracts or hedge by buying put options avoid risks of having to buy back contracts at a loss after a yield failure. Farmers using put options must pay an up-front premium, but can let the options expire unexercised if the market price rises above their strike price. Farmers holding minimum-price contracts may be charged for release from their contracts, but the charge should be relatively small, because such contracts contain no obligation to sell at less than the market price.

Table 2--Possible pitfalls of alternative methods of contracting

Pitfall	Method of contracting				
	Sell futures	Buy put options	Cash contracts		
			Fixed-price	Minimum-price	Deferred-price
Added losses when yields fail	X		X		
Inability to meet margin calls	X				
Unfavorable cash-futures price relationships	X	X			
Buyer default			X	X	X
Imprudent trades	X	X			

Inability To Meet Margin Calls

When the price of a futures contract moves sufficiently against a trader, the trader receives a call for additional margin from his or her broker. If a margin call is not met with payment within a reasonable time (typically 24 hours for small traders), the broker liquidates the trader's position. This liquidation can expose a hedger to losses from subsequent price variations. (See "Meeting Margin Calls" in the Futures Contracts section.)

Unfavorable Cash-Futures Price Relationships at Delivery

Few farmers who use futures and options can advantageously deliver on their contracts. Either excessive hauling costs would be involved, or the qualities produced do not match those required for delivery. Thus, farmers who hedge usually trade out of their futures or options positions before the delivery month, and deliver their products to cash buyers instead of to the futures market. The financial outcome depends critically on the cash-futures price relationship when the hedge is lifted. A serious problem may arise if the local cash price is unexpectedly low compared with the futures price.

Transportation bottlenecks or lack of adequate storage space sometimes distort cash-futures price relationships and prevent commodities from reaching normal market outlets. Delivery period squeezes on futures markets may also distort price relationships. Squeezes occur when one or a few traders who hold long positions in a maturing futures contract, and control much of the deliverable supply, force short position holders to buy back contracts at an inflated price. Such a long squeeze would raise the futures

price and cash prices for deliverable stocks, but not for stocks that are not deliverable. This could force short hedgers who are not able to deliver on the futures to buy out their futures positions at an elevated price without receiving a corresponding elevated price for the commodity sold on the cash market. To avoid price distortions associated with possible marketing bottlenecks or delivery-period squeezes, most farmers close out their futures positions well before the last day of trading.

Buyer Default

Another possible pitfall of contracting is the failure of the other party to live up to the contract. The danger to contract holders from default by other parties is small in futures trading, where the broker and exchange clearinghouse back each contract. In cash forward contracting, however, each party depends on the financial integrity of the other party and can resort only to the courts to resolve grievances. This provides the seller limited protection should the buyer go bankrupt, or for some other reason fail to meet the provisions of the contract.

Imprudent Trades

Bad judgment or recklessness may hurt farmers who use futures. Making forward commitments is so easy in futures markets that farmers, like other traders who have an opinion about prospective price changes, are tempted to take purely speculative positions. For example, some farmers who are optimistic about prices may buy futures instead of selling futures to cover the commodities they are producing or storing. If prices then decline, such farmers lose on both their cash and their futures positions.

Choosing Among Alternatives

Cash contracts assure outlets and fit farmers' and buyers' specific needs.

Farmers frequently use cash contracts with local buyers to assure prices, outlets, or both. Contracting to assure outlets is especially important for producers of perishable or semiperishable commodities, such as vegetables for processing, eggs, broilers, and some fruits. Once produced, these commodities must be processed or consumed promptly, leaving little time for the farmer to seek buyers or to bargain for price. In some years, even growers of grain and other storable crops might not obtain access to local handling, drying, and warehousing services at harvest without previous agreements with local elevators to provide such services. Also, producers of specialty crops, such as seed or popcorn, for which there are few buyers may need advance agreements to move such crops into marketing channels at harvest.

Cash contracts range from those that are quite firm in what is to be delivered to those that allow considerable leeway. Some contracts allow substitution of qualities at stipulated price differentials. Crop contracts call for delivery of either a fixed quantity of a commodity that is a safe quantity from the standpoint of yield prospects, or the output of a specified acreage, however much that happens to be. The buyer bears the yield risk in the latter type of agreement. This is an advantage to the farmer to be considered along with the price and other terms of the contract.

Favorable Conditions for Using Cash Contracts

Cash contracts are essential to many producers of specialized or perishable commodities. Only cash contracts can assure the farmer a satisfactory outlet at harvest or when a product is ready to deliver (see box).

For many commodities, futures contracts are either not available or not actively traded. Even for commodities with active futures and options trading, problems with basis uncertainty, contract size, and margin calls can make futures or options unattractive to farmers.

By using cash contracts instead of futures contracts, farmers avoid uncertainty about the basis (cash-futures price difference) at delivery time. Cash contracts can be tailored to meet the farmer's and buyer's need for

quantity, quality, and place and time of delivery, as well as other terms.

On the buying side, many merchants and processors like to assure themselves of commodity supplies having the qualities, locations, and delivery times most suitable to their particular needs. Buyers therefore frequently offer firm price inducements to farmers to meet such specifications.

Production Contracting

Some buyers with exacting commodity requirements, such as broiler processors and vegetable canners and freezers, do more than write tight delivery specifications. They often provide inputs and oversee production. Contracts that not only prescribe conditions for delivering the product but also conditions on the use of inputs and production practices are called production contracts. There are many types of production contracts, including contracts where the farmer provides only a growing or feeding service. Production contracts frequently do not set the price for the product or service, but instead provide a formula for determining price based on market prices to be observed later (see "Deferred Pricing" in the Cash Contracts section).

Minimum-Price Contracts

Some buyers of farm products guarantee farmers a minimum price, while agreeing to pay a higher price if market conditions warrant. For example, an elevator may contract with farmers to buy their grain at either a specified minimum price, or the elevator's bid price, whichever is higher. Alternatively, the farmer's choice may be between a minimum price and a price set as a fixed difference or basis relative to a futures price to be observed later.

The protection against downward price movements afforded farmers by minimum-price contracts is much like that obtained from holding put options. Both allow the farmer to gain from price increases. However, unlike put options, which can be allowed to expire unused, minimum-price contracts obligate the farmer to sell the commodity to the buyer. Minimum-price contracts can be adapted to fit the seller's and buyer's specific needs. The price guarantee embodied

in a minimum-price contract has a value that is analogous to a put option premium. The buyer who offers such a contract must either collect a payment in advance or deduct it from the payment for the commodity when the commodity is delivered. Buyers can hedge their minimum-price contracts by buying put options.

Ties to Futures Trading

Many local buyers make daily firm bids on farmers' prospective outputs for future delivery. This has long been the case for cotton, has become normal for grains, and is becoming common for cattle and hogs. In most cases, the ability to quote a firm bid to the farmer for future delivery is predicated on the existence of an active futures market. Most local buyers would be unwilling to guarantee prices to farmers for deferred delivery if the resulting exposure to price risk could not be offset by trading futures or by contracting with other merchants or processors who trade futures. When the farmer accepts a forward price offer, the buyer normally would hedge this commitment to the farmer by selling forward to a buyer at the next level, or by selling futures. This strengthens the financial integrity of the farmer's contract because the buyer is protected from any subsequent price decline. The buyer would then be able to pay the farmer the full contract price even if the price of the commodity had declined by the time of delivery. In effect, the local buyer acts as a forward pricing intermediary for the farmer.

Potential Problems

The hazards of nonperformance in cash forward dealings are real. A large decline in prices may make forward buyers insolvent and thus unable to honor their commitments. The financial strength of the buyer is therefore an important consideration for the farmer who is contracting.

From the buyer's vantage point, the same problem exists; a sharp rise in prices may lead some farmers to reduce their delivered quantities. In particular, where acreage rather than volume contracts are written, some farmers may underdeliver or overdeliver on their contracts, according to whether prices have risen or

fallen since the agreement was entered. While firm quantity contracts avoid this difficulty, the financial ability to honor them remains a factor for both sides.

Finding the best deal can be a problem with cash forward selling. Good information on market conditions may be hard to get, especially in production areas where there are few buyers.

Cash contracts are not easily altered. If conditions change after a contract is signed, the possibilities of withdrawing from the contract or transferring the contract to a third party are limited.

Pros and Cons of Cash Contracting

Pros

- Assures a physical outlet for a commodity being produced or stored.
- Contract terms can be tailored to fit individual needs.
- Avoids exposure to futures margin calls.
- Avoids exposure to basis risk (price relationship risk).

Cons

- Requires comparisons among potential buyers to determine if price and other terms are competitive.
- Cash buyers occasionally fail to meet contract terms.
- Difficult to change once contract is entered.

Deferred Pricing

Cash contracts can leave price to be determined later by formula.

A farmer may wish to assure an outlet for a product without setting price. Perhaps the farmer expects higher prices in the future, or perhaps no firm forward price offers exist. Or, farmers may want to plan for delivery at harvest but postpone setting the price until later. Deferred pricing involves agreeing on both the nonprice terms of trade and a formula for determining price, but not on the price itself.

Both buyer and seller can operate more efficiently and profitably if they can agree to a schedule of deliveries, types and qualities of product, weighing and inspection procedures, and plan of payment. Farmers who wish to speculate on the price level, or have to because of a lack of forward purchase offers, can often enter into contracts that establish all the terms for a trade except price.

The Formula for Determining Price

Deferred pricing agreements commonly specify (1) a particular base price quotation to be used, and (2) a differential relative to the base price. In many cases, a regularly reported quotation for spot delivery of the commodity at a central location serves as the base price. Deferred pricing based on cash quotations at the time of delivery is common in production contracts for eggs, broilers, and vegetables for processing.

When available, a futures price can be a convenient base price for deferred pricing. Deferred pricing of grains and soybeans based on futures is called basis pricing or "booking the basis." The farmer often is allowed to choose the date when the agreed-upon price difference is applied to determine the price. For example, a farmer might contract corn to a local elevator in June at 20 cents below the December futures. On any day between June and December, the farmer may decide that the December futures price is acceptable, and ask the buyer to fix the price. This may be after harvest and while the corn is in storage at the elevator. The farmer's return would be the price for December futures on the selected day, minus 20 cents.

Deferred pricing based on futures is convenient for buyers. If the buyer wishes to pin down the cost at the time of the agreement, the buyer can purchase futures contracts for the same commodity and sell

them on the exact day that the farmer elects to fix the price. Alternatively, the buyer can limit exposure to price changes by waiting until the farmer fixes the price and then selling corresponding futures contracts. Later, when the commodity was sold or used, the buyer would offset the futures sale with a futures purchase.

Issues to Consider

Although deferred price contracts facilitate efficient flows to market, they do not insulate farmers' returns from subsequent changes in price levels. In other words, the farmer can gain from a price increase or lose from a price decrease as long as the price remains to be set.

Choosing the base price is important in deferred pricing. The base price should reflect competitive values for a commodity that is as close as possible in grade, time, and place of delivery to the commodity the farmer will be delivering. If the base price is for a substantially different quality or type of product than the farmer plans to deliver, the problem of specifying a fair price differential may be difficult to overcome. Workable arrangements often are possible, however, using quotations for broadly representative grades and locations. The problem is common to both cash price quotations and futures price quotations.

Delayed Pricing

Some deferred pricing contracts allow ownership to pass to the buyer before price is determined. This is called delayed pricing. It is one of several ways to extend the farmer's range of selling opportunities, and has been used in grain marketing, where it enables farmers to speculate on a price rise while the elevator takes title to the grain and ships it on to users. Delayed pricing has been prominent during the heavy harvest movement when limited onfarm and country elevator storage space requires the movement of grain (or other crops) to other locations, such as grain terminals, processors, and export points. To illustrate, suppose a farmer must find a place to deliver a crop at harvest, but the local elevator does not have storage space available. A delayed pricing agreement might enable the elevator to sell the crop to the next buyer, take physical delivery, and immediately ship it on. The farmer would be paid the elevator's posted price

on a subsequent day of the farmer's choice, minus an allowance for storage. The elevator could cover its price commitment to the farmer by buying futures and subsequently selling the futures on the day the farmer chooses to set the price.

Delayed pricing allows farmers to speculate on price increases after they have delivered their products. If the farmer agrees to accept the buyer's posted price, the farmer is also speculating on the basis (the difference between the local price and the futures price). Some delayed pricing agreements specify the price in terms of a basis relative to the futures price. This eliminates basis uncertainty for the farmer. An alternative method for speculating on price increases after surrendering title to a product, and one that avoids basis speculation, is to buy an equivalent amount of futures contracts.

Delayed pricing can pose special problems for farmers. For farmers who have agreed to accept the elevator's posted price on a day of the farmer's choosing after delivery to the elevator, the competitiveness of the posted price may be at issue. A buyer with many outstanding delayed pricing contracts and few other buying opportunities might be tempted to post lower than competitive prices during the time in which the outstanding contracts are to be fixed.

Doubts about the security of contracts may arise when the price remains to be fixed after the farmer's crop has been delivered to the elevator and title has been surrendered. The farmer's assurance of getting paid rests on securing a valid claim against the buyer and on the financial strength of the buyer.

If the buyer sells the commodity before the farmer has fixed the price, the buyer presumably will have purchased an equivalent in futures contracts to avoid the risk of loss from any subsequent rise in price. This raises questions of sound practices by buyers in their efforts to meet all financial commitments. The farmer, having ceded title to the crop, is an unsecured creditor, and thus may not recover the value of the grain if the elevator should become insolvent.

Farmers who hold warehouse receipts would be prior claimants. Thus, a farmer who wished to deal with an elevator under a delayed pricing arrangement should first check the financial condition and bonding of the elevator.

Pros and Cons of Deferred Pricing

Pros

- Can assure an outlet for a perishable product when the buyer is unable or unwilling to offer a firm forward price. Example: contracting vegetables for processing.
- Can assure an outlet while the farmer speculates on a price increase. Example: contracting during the growing season to sell a grain crop at a fixed price differential relative to the futures (also known as booking the basis).
- Can allow the farmer to speculate on a price increase when storage space is not available after harvest. Example: delayed pricing of grain that has been turned over to an elevator and shipped on to a processor.

Cons

- Leaves the farmer exposed to risks of unfavorable price movements.
- Surrendering title to a commodity without receiving payment leaves the farmer particularly vulnerable to loss if the buyer goes bankrupt.

Production Contracts

Production practices and use of inputs can be specified in contracts.

Coordination between growers and processors is essential to assure high-quality and timely movement of perishable products from the farm to the processor. To provide this coordination, processors commonly enter into production contracts with growers, particularly for products such as broilers, eggs, vegetables for processing, sugar beets, sugar cane, and certified seed. Production contracts also have been widely used in hog production in recent years. Production contracts generally require the grower to follow certain production practices and to meet quality standards set by the processor. The contracts may call for the processor to provide certain inputs. Some contracts cover 1 year's production, but longer term contracts are commonly used where the farmer must invest in facilities to obtain the contract. Because the decision to enter a production contract generally involves a multiyear commitment of the farmer's resources, it calls for careful analysis (see box).

Differences Among Production Contracts

Most production contracts call for the farmer to supply land or facilities and labor while the integrator (processor) guarantees an outlet and sets standards regarding production practices and the quality of product delivered. Integrators commonly provide seeds, chemicals, and harvesting services under crop production contracts. They may also plant, cultivate, or apply chemicals. Integrators often provide the animals, feed, and veterinary services under livestock production contracts, but arrangements vary greatly. Contract terms continue to change and evolve, particularly for commodities such as hogs, where contracting has expanded rapidly in recent years.

The method for determining the payment from the integrator to the farmer varies greatly among production contracts and determines each farmer's return and risk exposure. Many contracts provide for deferred pricing (determining the farmer's payment by formula based on a market price to be observed later). Under some contracts, the farmer's return is calculated as a residual after processing costs have been subtracted from the value of the final product. Such pricing methods leave the farmer with uncertain returns throughout the growing period. Some contracts eliminate the farmer's price uncertainty by specifying at the outset the price or payment per unit of product delivered.

Advantages of Production Contracts

Contracting can lower processors' costs by assuring timely and dependable supplies of raw products that meet specific quality requirements. For example, by scheduling planting and harvesting with growers, vegetable processors can assure smooth flows of products to their plants and extend the processing season. The coordination that production contracts provide helps assure farm products of high and uniform quality that can be processed into products that meet consumers' desires and stimulate demand. Both the integrator and the grower stand to benefit when consumers' desires are met more closely.

Growers who enter production contracts may receive higher or more dependable returns on their labor and capital than they could earn by producing the same or other products for sale on the open market. However, integrators usually can attract sufficient numbers of growers by offering contract terms that provide growers only slightly higher incomes than could be earned in more traditional farming activities. In return for higher incomes, contract growers may have to put in longer hours to comply with production requirements and quality standards.

Contracting may enable growers who are short on capital to expand operations and gain economies of size. In many cases, integrators provide some inputs as well as financial backing for investments in buildings and equipment that growers could not otherwise afford. Contracting may give the grower access to labor-saving equipment, improved methods of disease and pest control, and other advanced technology that would be more costly otherwise.

Like other types of contracts, some production contracts reduce grower's price risks by fixing a return at the beginning of the production period for the product or service being produced.

Disadvantages of Production Contracts

Farmers who enter production contracts turn over some of the decisions about production to the processor. The production standards prescribed in some contracts are demanding. The grower may be left with many conditions to fulfill, a heavy work load, and little decisionmaking freedom.

Contracting does not necessarily reduce risk for the grower. When the price that the processor pays to the grower is set by formula, the grower bears the price risk. The prices for some products grown under contract are highly variable from season to season.

Some production contracts involve multiyear commitments, such as contracts that call for installing buildings and equipment. In entering such a contract, a grower becomes dependent on the policies and financial integrity of the contracting firm. These policies may change to the grower's detriment. For example, the processor may offer less favorable terms when the contract comes up for renewal. This could leave the grower with a difficult choice between accepting a lower return or idling buildings and equipment that had been constructed and financed to fulfill the contract. At the extreme, the processor might go out of business, leaving the grower with a product that has no outlet, or money tied up in facilities that have no good alternative use. Firms that offer production contracts usually have a strong market position and adequate finances to cope with adverse market developments. This has not always been the case, however. Many vegetable shippers and canners have been undercapitalized. The only way they can survive, and many do not, has been to write agreements with farmers that deduct the packing and processing costs from the proceeds of fresh or canned goods sales, leaving the residual return, if any, to the farmer.

Questions To Ask Before Entering a Production Contract

How financially sound is the firm that is offering the contract?

Are other farmers with similar contracts satisfied?

How is price determined and who bears the price risk?

What investments will the farmer have to make? Are returns on these investments reasonably assured by the contract?

How difficult will it be to meet the production and quality standards specified in the contract?

Are more desirable contracts available from other integrators?

How Futures Markets Work

Futures contracts offer highly competitive pricing, contract security, and ease of recontracting.

Futures contracts are actively traded on more than a dozen commodities that farmers produce or use as inputs (table 3). Many of these commodities are traded on two or more exchanges. New contracts are added from time to time, and old contracts sometimes become inactive or cease trading. The prices generated on futures markets are widely reported and useful, even to farmers who do not actually trade futures. Farmers with sufficient volume who seek access to the best bids or offers and flexibility to recontract may wish to consider using futures contracts as an alternative to cash contracting.

Successful use of futures requires an understanding of how the futures market relates to the cash market and how trades are made. This section provides an introduction to futures trading; individuals planning to use futures in the farm business should seek additional information from other publications and/or by attending classes or seminars. In many States, extension marketing specialists conduct classes or seminars on futures trading for farmers. Brokerage firms, commodity advisory firms, and the exchanges themselves also sponsor seminars and classes.

Standardized Contract Terms

Standard contract terms, coupled with guarantees that the exchanges and their members provide, enable strangers to trade futures contracts with each other without misunderstanding and with minimal concern about contract default. This brings many traders into contact with each other and assures competitive prices.

Futures contracts are standardized with respect to quantity, time, grade, location, and method of delivery. Only price is left to be set at trading time. For example, each corn futures contract traded on the Chicago Board of Trade calls for the delivery of 5,000 bushels of No. 2 Yellow corn in approved warehouses in Chicago, Toledo, or St. Louis. Alternative grades may be delivered at stipulated price differentials. Contracts are traded for delivery in March, May, July, September, and December of each year.

Futures trading is further standardized by the time of day contracts can be traded, the minimum price increment, and the total amount the price may move during each day. For example, trading in Chicago Board of Trade wheat futures contracts occurs only between 9:30 a.m. and 1:15 p.m., Chicago time,

Table 3--Farm products and inputs traded on futures markets

Commodity	Exchange ¹	Delivery months
Cattle, feeder	CME	Jan., Mar., Apr., May, Aug., Sept., Oct., Nov.
Cattle, live	CME, MCE	Feb., Apr., June, Aug., Oct., Dec.
Corn	CBOT, MCE	Mar., May, Jul., Sept., Dec.
Cotton	NYCE	Mar., May, July, Oct., Dec.
Hogs, live	CME, MCE	Feb., Apr., June, Jul., Aug., Oct., Dec.
Oats	CBOT, MCE	Mar., May, Jul., Sept., Dec.
Orange juice ²	NYCE	Jan., Mar., May, Jul., Sept., Nov.
Pork bellies, frozen ²	CME	Feb., Mar., May, Jul., Aug.
Rice, rough	CRCE	Jan., Mar., May, Jul., Sept., Nov.
Soybeans	CBOT, MCE	Jan., Mar., May, Jul., Aug., Sept., Nov.
Soybean meal	CBOT, MCE	Jan., Mar., May, Jul., Aug., Sept., Oct., Dec.
Sugar, domestic ²	CSCE	Jan., Mar., May, Jul., Sept., Nov.
Wheat	CBOT, KCBT, MGE, MCE	Mar., May, Jul., Sept., Dec.

¹CBOT-Chicago Board of Trade; CME - Chicago Mercantile Exchange; CRCE - Chicago Rice and Cotton Exchange; KCBT - Kansas City Board of Trade; MCE - MidAmerica Commodity Exchange; MGE - Minneapolis Grain Exchange; and NYCE - New York Cotton Exchange.

²Not a direct product or input of farms, but of possible hedging use to farmers.

Monday through Friday, excluding holidays. The trading is done at price intervals of 0.25 cent per bushel, and, except for the delivery month or during periods of extreme price volatility, at no more than 20 cents per bushel above or below the previous day's settlement price.

Because the delivery terms seldom exactly match business needs, futures contracts are not often used to arrange for physical delivery. Instead, they are used to temporarily set prices until satisfactory trades can be arranged on the cash market. This is called hedging. Once the cash trade is completed, the futures contract is canceled by an opposite trade. Most futures contracts are canceled by opposite trades before delivery. Positions not liquidated by the final day of trading must be settled by delivery. An exception is the feeder cattle contract, which calls for a final cash settlement at contract maturity instead of physical delivery.

Futures Exchanges and Brokers

All futures trades are executed by exchange members on the trading floor of an exchange. Members may trade for their own accounts and buy and sell for customers. When trading, exchange members stand in a pit, or around a ring, and buy and sell by open outcry and hand signal. Accounts are settled daily between members through the exchange clearinghouse. An exchange membership (known as a seat) has a value commensurate with the expected value of the trading privileges and services provided to members. Because the total number of seats is limited under the bylaws of the exchange, a would-be member must purchase or rent a seat from an existing member.

Persons who are not members of the exchange must trade through brokers (futures commission merchants). Such trades usually begin when the customer telephones a buy or sell order to the broker. The broker assures that the order is in proper form and that the customer is a legitimate account holder with the firm, and then forwards the order electronically to the trading floor for execution. Many brokerage firms are represented on the trading floor by officers or employees who are exchange members. Otherwise, brokers place their trades through other brokers whose officers or employees hold memberships.

Broker and Clearinghouse Guarantees

The trading facilities and contract guarantees that the exchanges and their members provide enable anyone with modest financial resources to trade futures. Just

as customers must deposit margin funds with the brokerage firms, the brokerage firms must, in turn, deposit margin funds with the exchange's clearinghouse. The clearinghouse, which is an adjunct to or division of the exchange, guarantees each contract by, in effect, becoming the buyer to every seller and the seller to every buyer.

Because all trades pass through the clearinghouse, any trader can offset a previous trade through a new equal and opposite trade with a third party. The trader's purchase and sale cancel each other and remove the trader from the market. Only when positions are held until delivery is it necessary to match up buyers and sellers. This matching is done by the clearinghouse using rules established by the exchange. In short, futures trading is safe from the standpoint of contract integrity and efficient from the standpoint of recontracting.

Regulation

Elected officers and member committees operate the exchanges by establishing bylaws and rules to assure responsible, efficient, and equitable trading. Standards and procedures are set regarding time, place, and method of trading, fair dealing, grades, weights and inspections for delivery, and arbitration of disputes. Minimum margin rules and capital requirements are set for members who deal for others. Prohibited activities include willful disruption or distortion of market equilibrium, price manipulation, and spreading false or inaccurate market information. Members who violate rules face punishment or loss of membership.

Beyond the controls that the individual exchanges exercise, the National Futures Association (NFA) regulates the conduct of futures brokers, whether or not the brokers are members of an exchange. The NFA is an industry-financed and operated agency created under Federal legislation and responsible to the Commodity Futures Trading Commission (CFTC). The NFA registers dealers and performs audits and investigations. Every futures broker must be a member of the NFA.

The CFTC is an independent Federal agency that holds broad jurisdiction over futures trading. Aside from overseeing the regulatory work of the commodity exchanges and the NFA, the CFTC engages in market surveillance to detect and deal with market disruption, approves new contracts and revisions of existing contracts, monitors the protection of customer funds, and limits the size of positions that any speculative trader or group can take. Also, the CFTC hears complaints that traders register against their brokers.

Using Information Contained in Futures Prices

Futures prices can help farmers anticipate what their products will be worth at delivery time.

Each futures price reflects what knowledgeable traders think a unit of the commodity, of the grade and at the location specified, will be worth at contract maturity. Such anticipated prices help farmers determine what crops to grow, whether to store after harvest, or when to put livestock on feed. To use this information most effectively, the farmer needs to set the price level by entering a cash, futures, or options contract.

Because agricultural futures contracts generally are traded for no more than 12-15 months before they mature, futures price quotations are useful mainly for making within-year production and storage decisions rather than longrun investment decisions. To take advantage of anticipatory price information, the farmer must have some flexibility to either switch between commodities, vary the intensity of cultivation or rate of feeding, postpone production, or store until prices are more favorable. The futures prices must be observed, converted to local prices, and compared with costs before production or storage commitments are made.

Interpreting Futures Price Reports

Table 4 provides an example of daily futures price quotations for an agricultural commodity. Seven corn futures contracts were open for trading on November 10, 1992, with delivery dates ranging from December 1992 to March 1994. The open, high, low, and settlement prices along with the price change and number of open contracts are reported for each

delivery month. Of particular interest is the daily settlement price, which is the price established at or near the close of trading each day that is used to determine the value of traders' positions. For the day shown in the table, December 1992 corn futures settled at \$2.06½ per bushel, while March 1993 corn settled at \$2.16¼ per bushel. Thus, on November 10, 1992, the expected price of spot corn for delivery at Chicago during the month of December was 206½ per bushel, and the expected return for storing corn from December to March was 9¾ cents per bushel.

Converting Futures Prices to Local Cash Prices

Futures prices must be converted to local cash prices for farm decisionmaking. This conversion involves adjusting the observed futures price by the anticipated basis (cash-futures price difference). Basis anticipations can be formulated based on experience on corresponding dates in previous years. (See: "Predicting End-of-Period Basis" in the Futures Contracts section).

Estimating Variable Costs

To make sound shortrun decisions, the farmer must know his/her variable costs. Variable costs are those costs that can be avoided by not producing or storing. Production or storage is advantageous only if revenues exceed variable costs; the greatest shortrun profits are obtained by producing or storing the commodity with the highest revenues over variable costs. The variable

Table 4--Corn futures prices for November 10, 1992

Contract	Open	High	Low	Settlement	Price change ¹	Open contracts ²
	-----Cents per bushel-----					Number
December	206½	207	206	206½	0	106,428
March 1993	216	216½	215¾	216¼	+ ¼	65,471
May	223¾	224¾	223¾	224	+ ½	30,499
July	228	229	227¾	228¾	+ ½	44,139
September	232½	233¾	232½	233½	+ ¾	3,354
December	237¾	238½	237½	238	0	9,224
March 1994	244¼	245	244¼	244½	+ ¼	227

¹Price change compares settlement with that on previous trading day.

²Reflects previous trading day. Estimated trading volume: 30,000 contracts.

Source: Wall Street Journal, November 11, 1992, page C12.

costs for growing crops include expenditures for seed, fertilizer, chemicals, fuel, hired labor, custom services, rent, and interest on operating loans. Variable costs for storage include the cost or value of the commodity stored, interest on funds invested in the commodity, and payments for binspace if it is rented. For livestock feeding, variable costs include costs for feeder animals, feed, labor, supplies, interest on operating capital, and payments for feeding facilities and services.

Suppose that on February 28, May corn futures are priced at \$2.73, the expected local basis in May is \$0.25 below the May futures, and the current local price of corn is \$2.40. This gives an expected local price in May of $\$2.73 - 0.25 = \2.48 , and an expected return of $\$2.48 - \$2.40 = \$0.08$ for storing locally from now until May. If the farmer is paying 10-percent interest and \$0.03 per month for storage in a local elevator, should the farmer sell now or store until May?

The farmer's interest cost on the corn for 2 months is $2/12 \times 0.10 \times \$2.40 = \$0.04$ per bushel and warehousing cost is $2 \times \$0.03 = \0.06 per bushel giving total cost of \$0.10 which exceeds expected return from storage of \$0.08 by \$0.02. Thus, storage from March to May is unprofitable for this farmer (See column 1 in table 5).

Suppose that another farmer is holding corn in a good farm bin that has no alternative use. Warehousing cost for 2 months added storage is closely to zero for this farmer. Virtually the only storage cost that this farmer needs to cover is interest cost on the corn. This farmer's expected profit from storing would be $\$0.08 - \$0.04 = \$0.04$ per bushel (column 2, table 5).

Consider a third farmer who is paying \$0.025 per bushel per month for elevator storage, is debt free, and earns 7.5-percent interest on money deposited in a bank. The relevant interest rate for this farmer is the interest rate that could be earned on the money tied up in the corn, not the interest that would be paid for a loan. Interest cost for 2 months storage is $2/12 \times 0.075 \times \$2.40 = \$0.03$ per bushel. Warehousing cost is \$0.05, making total costs \$0.08 per bushel, equal to the expected \$0.08 per bushel gross return (column 3, table 5). For this farmer, storage is a break-even operation. The decision to store would depend on other factors, particularly on whether the farmer expected an increase or decrease in the overall level of corn prices.

All of the above calculations assume that the farmer holds the same price expectations as the market, and that the local basis will be \$0.25 per bushel below the May future on the first of May. If a different basis were expected, then the expected gross return should be adjusted accordingly. See pages 20-21 on predicting basis.

These examples show that storage decisions are quite sensitive to storage costs and expected basis. A single set of futures price quotations can carry quite different storage implications for prospective storers with different costs or different expectations about futures price changes and basis. Each storer needs to estimate his/her own storage costs and forecast basis with care to make the best storage decisions. The same is true for making decisions about crop production and livestock feeding.

Table 5--Example use of futures prices for making decisions about storing corn from March until May

Item	Farmer 1	Farmer 2	Farmer 3
May futures price	\$2.73	\$2.73	\$2.73
Expected May basis	<u>-.25</u>	<u>-.25</u>	<u>-.25</u>
Expected cash price in May	2.48	2.48	2.48
Current cash price	<u>-2.40</u>	<u>-2.40</u>	<u>-2.40</u>
Expected return from storage	.08	.08	.08
Interest on commodity	-.04	-.04	-.03
Warehouse cost	<u>-.06</u>	<u>0</u>	<u>-.05</u>
Expected storage profit	-.02	.04	0

Advantages and Disadvantages for Forward Pricing

Futures markets offer highly competitive prices and secure contracts, but expose the hedger to risks of margin calls and unfavorable basis.

Farmers can forward price with futures instead of cash contracts. Forward pricing with futures (also called hedging) involves selling or buying a futures contract as a temporary substitute for a cash sale or purchase to be made later.¹ Crop and livestock producers can forward price outputs by selling futures contracts during the planning, growing, or feeding stages of production and later buying back the futures as the actual commodity is priced on the cash market for spot or forward delivery. Livestock feeders can forward price inputs by buying grain, soybean meal, or feeder cattle futures as a temporary substitute for subsequent cash purchases.

Advantages of Forward Pricing with Futures

The advantages of forward pricing with futures instead of cash contracts include the ability to quickly lock in a competitive price without shopping around, high contract security, and the ability to quickly change one's position at any time (see box).

Futures markets provide ready access to the best bids and offers of many other traders. Futures prices are widely reported and trades can be executed at any time during the trading day at a price near the latest quotation. When trading futures, there is no need to call several different buyers or sellers to shop for the best price. Brokers on the trading floor efficiently perform the shopping.

Futures contracts are very secure. The exchange clearinghouse guarantees each contract for its members. This protects both the member and the member's customers from contract default by other members and their customers. Moreover, the customer is protected from failure of his/her own broker by the requirement that customers' funds be held in an account separate from the broker's account. It is possible, but very unlikely, for a customer to lose if a broker fails due to defaults by its other customers.

Futures traders can easily change the amount contracted or switch to a different delivery date if and when conditions or price expectations change. Futures are particularly useful to hedgers who want flexibility to adjust their exposure to price risk based on changing views of price and yield prospects.

Disadvantages of Forward Pricing with Futures

While futures markets are among the most sophisticated pricing mechanisms, they are not suited for everyone. Problems such as unfamiliarity and inconvenient contract size are evident at the beginning; others such as large margin calls or an unfavorable closing basis may come as a surprise.

To use futures effectively for forward pricing, one must invest some time to learn how the market works and how local prices relate to futures prices. Before actually trading, one must locate a suitable broker and open an account. Some brokers are oriented more toward speculation than toward hedging. The farmer is generally best served by a brokerage house that carries other farmer accounts, and an account executive who understands farming and agricultural hedging.

Futures contracts are inconveniently large for some farmers. For example, one 5,000-bushel soybean futures contract covers the output of about 150 acres at U.S. average yields. Using the smaller contracts traded on the MidAmerica Exchange can lessen this problem.

To trade futures, one must have cash reserves or arrangements with a lender to meet margin calls. Brokers call for additional margin payments whenever unfavorable price moves reduce the customer's margin deposit to a critical level. For a bona fide hedge, the loss on the futures position is matched by a gain in the value of the cash position, but the margin call must be paid immediately while the cash gain cannot be realized until the end of the production period. Failure to meet a margin call eliminates the hedge and exposes the hedger to price risks at a possibly critical time.

¹ Holbrook Working, a pioneering student of futures markets, defined hedging as entering a "contract to buy or sell on standard terms, established and supervised by a commodity exchange, as a temporary substitute for an intended later contract to buy or sell on other terms." (Working, Holbrook, "Hedging Reconsidered," *Journal of Farm Economics* 35 (1953): 544-61).

Unlike cash contracts, futures contracts expose the hedger to basis risk (cash-futures price relationship risk). Because futures contracts are standardized, their grade, time, and place of delivery specifications seldom exactly fit the product that the hedger plans to sell or buy. The hedger who has established an approximate price through a futures trade must subsequently enter a cash contract or sell or buy on the spot market to arrange actual delivery. When the pricing terms of the cash transaction take effect, the futures contract should be eliminated by an offsetting trade. The outcome for the hedger depends critically on the cash-futures price relationship that prevails as these closing trades are made.

The ease of making commitments in futures markets sometimes leads to losses for traders who become overconfident. Traders should also be aware of the possibilities of being misled or cheated by brokers or advisors and possibilities of being trapped by a delivery-period squeeze.

Many farmers as well as other futures traders have lost money by speculating--using futures to bet on price changes. The temptation to speculate in futures can be very strong for some farmers and can lead to severe losses. In taking a futures position, a farmer should know whether he/she is increasing or decreasing exposure to price risk. Farmers who hold risk-increasing positions need to watch the market closely and be prepared to close out their positions if conditions change.

Although the exchanges and the CFTC regulate futures trading, abuses sometimes occur. The most worrisome abuses include brokers cheating customers and delivery period squeezes. The great majority of brokers execute customers' orders conscientiously at the best prices available, but a few may take advantage of their customers. This may involve a floor broker's trading for his/her own account ahead of a customer whose order the broker holds, or allocating the most favorable trades to the broker's own account and less favorable trades to the customer's account. The CFTC has required floor brokers to time trades within short intervals to help eliminate such abuses by making them more easy to detect.

Some futures contracts may be vulnerable to squeezes during the delivery month. A squeeze occurs when an individual or group controls a substantial portion of

the open positions in a maturing futures contract, as well as a substantial portion of the deliverable supplies, and forces those on the opposite side of the market to trade out of their positions at a distorted price. Large squeezes, known as corners, were fairly common in the early years of U.S. futures trading. Exchanges soon learned that if they were to survive, they had to eliminate corners and mitigate squeezes. But the temptation remains. In today's markets, the likelihood of a substantial squeeze is small, but it exists. Thus, offsetting one's position well before the last day of trading is usually wise.

Finally, there remains some uncertainty about how the Internal Revenue Service will treat gains and losses from farmers' futures positions for tax purposes. Farmers may wish to consult their tax advisor before using such contracts for hedging.

Pros and Cons of Hedging With Futures

Pros

- Contracts can be entered quickly at highly competitive prices.
- Contract commitments can be changed easily if conditions change.
- Security of contracts is very high.
- Contract prices are widely reported.

Cons

- Cash reserves or lender support is needed for meeting margin calls.
- Basis risk (price relationship risk) may be a problem for farmers located far from delivery points.
- Contracts are too large for some small farmers.

Selecting a Contract for Hedging

The futures contract closest in grade and in time and place of delivery to the product to be sold or bought in the cash market usually provides the best hedge.

The best futures contract for hedging is the contract with the most predictable end-of-period basis (cash-futures price difference), provided that the contract size is not too large. This is usually the contract that prices the delivery grade, time, and location closest to that of the commodity to be sold or purchased on the cash market. A more actively traded contract may sometimes be preferred. Thus, for example, wheat growers would want to consider the wheat contracts traded at Chicago, Kansas City, and Minneapolis, looking particularly at contracts that call for delivery of the class of wheat that they grow.

The exchanges offer contracts maturing in 5 to 8 different months for each commodity traded, and many commodities are traded on two or more exchanges (see table 3 on page 12). Four exchanges trade wheat futures. Trading at the Kansas City Board of Trade is for Hard Red Winter wheat. Northern Spring wheat and White wheat are traded at the Minneapolis Grain Exchange. The Chicago Board of Trade and the MidAmerica Commodity Exchange contracts are primarily Soft Red wheat contracts, but the hard wheats are also deliverable. The MidAmerica exchange specializes in small contracts that are otherwise identical to contracts traded on the Chicago Board of Trade and the Chicago Mercantile Exchange. March, May, July, September, and December are delivery months for the grains on all exchanges. Soybeans are traded for delivery in these same months except December, and also for delivery in January, August, and November. The livestock contracts trade for delivery every other month, with extra contracts during the most active seasons.

Selecting the Exchange

In choosing a futures contract for hedging, one should consider not only grade and location for delivery, but also the contract size and level of trading activity. The most widely traded contracts are inconveniently large or lumpy for some farmers. For example, many farmers grow less than the 5,000 bushels needed for one soybean contract. Table 6 shows the approximate number of acres or head of livestock that the various contracts represent. In hedging growing crops, larger acreages than those shown in the table would be needed, because the farmer's revenue uncertainty

generally is minimized by selling no more than one-third to two-thirds of the crop before harvest, or before yield is well assured. Moreover, the crop may be divided between a landlord and tenant, with each making separate hedging decisions. Hence, direct hedging in futures generally is practical only for farmers with crop acreages two or more times those shown in table 6.

The live cattle contracts and live hog contracts traded at the Chicago Mercantile Exchange call for delivery of 40,000 pounds of live steers and 40,000 pounds of live butcher hogs. The cattle contract covers about 33 to 38 head at average weights for Choice steers, a convenient size for many cattle feeders. The hog contract calls for delivery of about 170 to 190 head of average weight butcher hogs. Although many small hog producers could not fulfill a single hog contract for one delivery date, a substantial number of hog producers market enough hogs at one time to fulfill one or more contracts. Yet even for these large producers, the contract may be inconveniently large if they do not sell in multiples of 170 to 190 head.

Two alternatives are available to the producer who finds the standard contracts too large. One alternative is to use the smaller contracts traded on the MidAmerica Commodity Exchange. The other alternative is to search for a cash buyer who would buy forward in suitable lot sizes.

To keep trading costs low, hedgers need liquid markets--that is markets where buy and sell orders are readily executed at or near the last quoted price. Futures markets generally are very liquid, but not equally liquid. The frequent trader can gauge liquidity from experience in getting orders filled at close to the last quoted price. The infrequent trader can expect help from brokers in evaluating the liquidity of various contracts. The contracts with larger trading volumes tend to have more floor traders and greater liquidity. Table 6 shows the average numbers of contracts traded daily for the various agricultural futures during 1991. These trading volume data must be interpreted with care. For example, special traders called changers buy and sell the same commodities concurrently on the MidAmerica exchange and on other exchanges. Trading by the changers makes MidAmerica contract

Table 6--Contract size, approximate acres or number of head per contract, and 1991 average daily trading volume for selected agricultural futures contracts

Commodity	Exchange ¹	Contract size	Approximate acres ² or number head	Average daily volume, 1991 ³
-----Number-----				
Cattle, feeder	CME	44,000 lb.	55-73 head	2,000
Cattle, live	CME	40,000 lb.	33-38 head	15,000
Cattle, live	MCE	20,000 lb.	17-19 head	<100
Corn	CBOT	5,000 bu.	40-50 acres	43,000
Corn	MCE	1,000 bu.	8-10 acres	2,000
Cotton	NYCE	50,000 lb.	80-85 acres	6,000
Hogs, live	CME	40,000 lb.	170-190 head	6,000
Hogs, live	MCE	20,000 lb.	85-95 head	<100
Oats	CBOT	5,000 bu.	90-100 acres	1,000
Oats	MCE	1,000 bu.	18-22 acres	<100
Rice, rough	CRCE	2,000 cwt.	31-38 acres	<200
Soybeans	CBOT	5,000 bu.	145-165 acres	35,000
Soybeans	MCE	1,000 bu.	29-33 acres	5,000
Wheat	CBOT	5,000 bu.	140-145 acres	12,000
Wheat	MCE	1,000 bu.	28-29 acres	1,000
Wheat	KCBT	5,000 bu.	140-145 acres	6,000
Wheat	MGE	5,000 bu.	140-145 acres	2,000

¹CBOT=Chicago Board of Trade; CME=Chicago Mercantile Exchange; CRCE=Chicago Rice and Cotton Exchange; KCBT=Kansas City Board of Trade; MCE=MidAmerica Commodity Exchange; MGE=Minneapolis Grain Exchange; and NYCE=New York Cotton Exchange.

²Acreage and head estimates are based on recent U.S. average yields and average marketing weights.

³Number of contracts traded during the year, divided by 254, and rounded to the nearest 1,000.

prices follow prices on the other exchanges more closely, in effect adding liquidity to the MidAmerica contracts.

Selecting the Delivery Month

The contract that is due to mature first after the intended date of sale or purchase of the cash commodity usually provides the best hedge. Sometimes a later-maturing contract may be preferred to provide flexibility for postponing the cash sale if conditions warrant, particularly for storable commodities.

Consider the farmer who wants to hedge an expected corn crop at planting time. Selling the current-year July or September futures would serve little purpose, because these are old crop contracts that will mature before the growing crop will be ready to sell. This

leaves the December contract and the March, May, and July contracts of the next calendar year. The choice would depend on the relative prices of the contracts for the different delivery months and on the farmer's storage costs and intentions. For example, if the crop is not to be stored after harvest, the December contract would be the logical choice for hedging. Alternatively, if the price for the March, May, or July contract exceeded the December contract price by more than the farmer's cost of storage, the farmer could sell one of these later maturing contracts, store the corn after harvest, and later buy an offsetting futures contract when the stored corn is sold. This illustrates how futures price quotations for different delivery months can provide guidance about how long to store the crop. Moreover, by selling the futures contract that matures at the end of the expected storage period, the farmer can approximately fix the return for both growing and storing the crop.

Predicting End-of-Period Basis

The end-of-period basis (cash-futures price difference) must be predicted to hedge effectively with futures.

A basis is the difference in price between a commodity sold locally and a commodity that is deliverable on a futures contract. The basis reflects costs of storage and transportation and differences in quality, if any exist. A basis is calculated by subtracting a specific futures price from a specific local cash price. For example, if a farmer's local price for soybeans were \$7.00 and March soybean futures traded at \$7.30, the farmer's basis relative to the March future would be $\$7.00 - \$7.30 = -\$0.30$ or "30 under." The relevant basis differs among farmers depending on location, grade, and the margins local buyers take. Consequently, care must be exercised in discussing basis to be sure that all parties understand which specific cash and futures prices are involved.

The profit or loss from a hedged production or storage operation depends critically on the basis that occurs when the commodity is sold and the hedge is lifted. Hedging would completely eliminate revenue uncertainty if the end-of-period basis could be predicted without error. The basis is never fully predictable, but it can normally be predicted with greater precision than the price level itself. The relative stability and predictability of basis means that hedging in futures generally reduces, but does not fully eliminate, price risk.

Basis can be predicted most accurately at locations and for grades that are near those specified for futures delivery. Uncertainty about the basis increases with distance from the par delivery point and as quality differs from the par delivery grade. For example, the North Carolina corn grower can expect greater basis risk in hedging on the Chicago futures market than can the central Illinois corn grower.

By predicting basis more accurately, the farmer can reduce revenue uncertainty and thereby improve production and storage decisions. Predictions of the end-of-period basis can be combined with futures price quotations to forecast the end-of-period cash price. Suppose that November soybean futures are selling for \$7.00 per bushel at planting time, and the predicted local basis at harvesttime is $-\$0.30$ cents per bushel. The expected local price at harvesttime is then $\$7.00 - 0.30 = \6.70 per bushel. Such forecasts might be compared with similar price forecasts for corn or cotton to determine how acreage is to be allocated between the different crops.

Basis forecasting begins with assembling information on cash and futures prices for corresponding time periods in past years. For example, to predict the October soybean basis relative to the November future, one would need to examine the difference between local cash prices and November soybean future prices for the month of October in several previous years. The historical bases could be averaged and adjusted for differences in interest rates and storage costs to forecast the current year's basis.

Seasonality in the Basis

To predict the basis, one needs to consider its seasonality. For example, spot prices for storable crops typically drop to a low point at harvesttime and then increase as storage costs are built into the value of the spot commodity. Because prices for individual futures contracts exhibit no pronounced seasonality, the cash price typically rises relative to the futures price--the basis becomes less negative--over the storage season. Figure 2 illustrates how the difference between the July corn futures price and the cash prices for corn in central Illinois tends to be widest at harvest and to grow progressively narrower over the storage season. In actual markets, this progressive narrowing of the basis over the storage season is partly obscured by the fluctuations in cash and futures prices.

Livestock prices also exhibit seasonality due to differences in production costs and supplies during different seasons of the year. However, seasonal patterns in basis for livestock are less obvious and more difficult to detect than those for crops. The spot prices for cattle or hogs may approach the futures price from either above or below as the futures contract matures, depending on the expected supply and demand in the delivery period compared with the earlier periods.

Effect of Location on the Basis

Because of hauling costs, cash prices for commodities tend to be relatively low in surplus production areas and relatively high at locations where the commodity is used or exported. For example, the delivery-month basis for grains and soybeans tends to be negative in the major growing areas and positive at the ports. Corn basis estimates for December 1 at selected locations are shown in table 7.

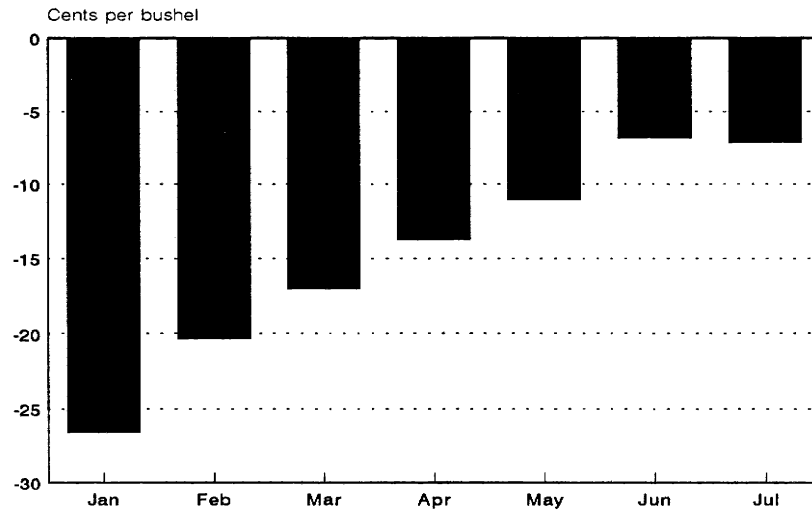
Factors Causing the Basis To Deviate from Normal Levels

The basis in any locality can deviate from the normal levels for many reasons. These include: local yield variation, weather conditions that interfere with delivery, transportation bottlenecks and strikes, changes in pricing policy by local firms, and futures

congestion or price manipulation. For example, a bumper crop in a particular locality may cause buyers to widen their margins to avoid being overrun with the commodity. This would make the basis more negative, to the disadvantage of local farmers. Thus, forecasts of local prices based on historical basis should be adjusted for any special conditions that are anticipated.

Figure 2

Average corn basis for central Illinois, using July futures¹



¹Based on first-of-month prices, 1989-91

Table 7--Corn prices and basis at selected locations, December 1, 1989-91¹

Location	1989	1990	1991
	<i>Cents per bushel</i>		
December futures	234¾	220½	239½
Central Illinois:			
Cash price	231	220	239
Basis	-3¾	-½	-½
Central Iowa:			
Cash price	217½	209	226
Basis	-17¼	-11½	-13½
Central Missouri:			
Cash price	217	212	233
Basis	-17¼	-8½	-6½
Southwest Kansas:			
Cash price	222	219½	250
Basis	-12¾	-1	10½
Gulf ports:			
Cash price	270½	251½	268½
Basis	35¾	31	29

¹Prices for Wednesday nearest December 1. Midpoints of reported ranges are shown.

Meeting Margin Calls

To hedge with futures, one needs cash reserves or standby credit for meeting margin calls.

To trade futures, one must deposit a sum of money in a margin account at the brokerage house that handles the trade. The margining system allows a trader to take on a large price exposure by depositing a small amount of funds. Initial margin requirements usually equal 5 to 15 percent of the value of the contract, depending on price volatility and the broker's policy. Small traders make margin deposits in cash, while large traders may be allowed to deposit interest-bearing government securities. The margin deposit assures the broker that funds are available to cover immediate losses the customer may incur on the futures position. If the price of the contract changes unfavorably for the customer, the broker may call for more margin money. Alternatively, the customer may withdraw margin money after favorable price changes. The broker may liquidate the customer's position if the customer fails to meet a margin call within a reasonable time period. The margin system has allowed futures to be traded successfully for well over a century with very little loss to traders from defaults by other traders.

Marking to Market

Futures contracts differ from cash forward contracts in that they are "marked to market" daily. This means, in effect, that each contract is rewritten each day at the latest settlement price, with the long (trader who bought the contract) and short (trader who sold the contract) gaining or losing, depending on the day's price change. Gains and losses are posted to each trader's account daily. For example, if the futures price goes up, each long account is credited and each short account is debited by the amount of the price change times the size of the trader's position. If and when the money in a margin account falls below a specified level, the customer is issued a margin call that requires payment of additional margin money to bring the margin up to the original level. The additional money that a trader must deposit after an unfavorable price change is called the variation margin.

Suppose that a farmer has acquired a short position by selling a corn futures contract for \$15,000 (\$3 per bushel for 5,000 bushels) and has made a \$1,500 initial margin deposit (table 8). Subsequently, the corn futures price rises to \$3.10, giving the farmer a \$500 loss and leaving only \$1,000 in the margin deposit,

which is below the required maintenance margin level. The broker would then call for a \$500 payment to bring the margin deposit up to the original \$1,500 level. Alternatively, if the price had moved down to \$2.90, the farmer would have a surplus of \$500 in the margin account, which could be withdrawn. In this case, traders with long positions would have to put up additional margin.

The initial margin deposit required of each trader is an amount sufficient to cover the losses likely to occur over a short time period. By law, these customer funds must be segregated from the other funds of the brokerage firm. If and when the account falls below a specified minimum maintenance margin level, the brokerage house calls for more margin. The account holder typically has about 24 hours to meet the margin call. Otherwise, the broker may liquidate the position. Larger margin deposits or more rapid response to margin calls may be required during periods of high price volatility.

When To Meet a Margin Call

For a speculator, a margin call represents a loss from being on the wrong side of the market. When confronted with a margin call, many speculators simply liquidate their positions to avoid further losses. In contrast, the hedger who receives a margin call normally has unrealized gains on the cash side that balance the losses on the futures. Premature liquidation of the hedge would leave the hedger exposed to variations in the cash price. If the price should then reverse direction, the hedger could lose twice. Consequently, hedgers normally want to meet margin calls to achieve their original price objectives. However, if the margin call occurs during the delivery month, the hedger should consider getting out of the position to avoid the possibility of a squeeze.

The following example illustrates the problem. A farmer who in mid-May 1988 expected to harvest 10,000 bushels of soybeans might reasonably have priced half of the crop by selling a 5,000-bushel soybean futures contract for November delivery at \$7.20 per bushel. By late June 1988, however, November soybean futures prices had climbed to more than \$10.00 per bushel due to drought concerns. The farmer who sold futures early not only lost out on this unforeseen price rise, but also would have had to post

Table 8--Example of meeting a margin call and withdrawing cash from a margin deposit¹

Item	When hedge is entered	After price changes	
		Price rises	Price declines
<i>Dollars per bushel</i>			
Corn price	3.00	3.10	2.90
<i>Dollars</i>			
Initial margin	1,500	1,500	1,500
Gain or loss	NA	-500	+500
Remaining margin	1,500	1,000	2,000
Margin payment required (-) or surplus available for withdrawal (+)	NA	-500	+500

NA = Not applicable.

¹Short position in corn futures taken at \$3.00 per bushel, initial margin of \$1,500, and maintenance margin of \$1,200 per 5,000-bushel contract.

about \$14,000 (5,000 bushels times \$2.80 loss per bushel) in variation margin on the short futures position. Without sufficient reserves or credit to meet such margin calls, the farmer might have been forced to buy back the futures position at \$10.00, take the \$14,000 loss, and then watch the futures price fall to below \$8.00 by November.

Arranging Lender Financing of Margin Calls

Margin calls need not be a big problem if reasonable precautions are taken ahead of time. These precautions include arranging for a lender to finance margin calls and exiting futures positions before the delivery month. Except during the delivery month when a squeeze may be the cause, a futures price change that results in a margin call normally is accompanied by a corresponding change in the value of the commodity being hedged. The loss on the futures position is balanced by an approximately equal gain on the cash position. For example, a price increase that results in a margin call for a short hedger also increases the value of the commodity that the hedger is producing or storing. The problem is

that the margin payment is due immediately, while the increased value of the product cannot be realized until the end of the production period. However, the increase in the value of the product typically justifies a larger short-term loan. The farmer's lender generally can safely advance funds for meeting margin calls before the futures delivery period begins, if the lender is assured that the farmer maintains a bona fide hedge.

Farmers who hedge in futures generally need assurance that credit will be available for meeting margin calls. At the same time, the lender needs assurance that the farmer will maintain the hedge to protect the value of the collateral until the product is sold and the loan is repaid. These mutual assurances can be made through a three-way agreement between banker, broker, and farmer.

In crop production, the lender also needs assurance that a yield failure will not jeopardize the farmer's ability to repay the loan. The lender may encourage or insist that farmer-borrowers carry crop yield insurance in addition to hedging in futures or forward pricing with cash contracts.

Making and Taking Delivery

Making or taking delivery on futures contracts is seldom advantageous for farmers.

Relatively few futures contracts result in delivery. In most cases, delivery would divert the commodity from normal marketing channels and would impose added transportation and inspection costs on the seller, the buyer, or both. To avoid these added costs, farmers and other commercial users of futures contracts normally trade out of their futures positions and arrange delivery under more convenient and profitable terms on the cash market. Long position holders may also avoid taking delivery because of uncertainties about where or when delivery will occur, or what specific qualities will be delivered.

By liquidating their futures positions before the delivery month begins, traders avoid the increased price volatility that sometimes occurs during the final weeks of trading on a contract. Although the cash and futures prices converge during the delivery month to within the cost of making delivery, the convergence can be irregular and prices may vary as large short and long position holders maneuver for advantage.

Variations in Delivery Among Commodities

Delivery arrangements vary among commodities (table 9). For grains and soybeans, delivery involves transferring from seller to buyer ownership of a warehouse certificate issued by an approved warehouse. The buyer must pay for the commodity at the settlement price for the most recent day of trading.

Shipping certificates are used to deliver some commodities. A shipping certificate is a document issued by a regular (exchange-licensed) shipper calling for delivery at shipper's locations of a specific number of contract units to the bearer. The certificate represents a call on the shipper's current inventory or future production. Specific lots of live animals are delivered under the live cattle and hog futures contracts.

Instead of delivery, the feeder cattle contract uses cash settlement, which involves an exchange of funds between longs and shorts based on specified cash-market quotations. Cash settlement avoids the costs of moving commodities outside of their normal channels of trade, but it requires a widely

recognized and observable cash price that accurately reflects cash market values.

Mechanics of Making and Taking Delivery

Although farmers, like other small traders, seldom deliver on futures contracts, occasions may arise when delivery is advantageous, particularly for farmers near a delivery point. Delivery is profitable for the seller if the seller's product is of deliverable quality and if the futures price during the delivery period exceeds the local cash price by more than the costs of transporting the product to the delivery point, getting it into an approved warehouse, and inspecting and certifying the product for delivery.

Futures delivery is initiated when a short position holder submits through his/her broker a notice of intention to deliver. The delivery notice states the number of contracts, the day and place of delivery, and the grade to be delivered, within the alternatives the contract allows. Traders holding long positions during the delivery month must be prepared to accept delivery on any day at the seller's discretion. When the clearinghouse receives a notice of intention to deliver, the brokerage house with the oldest long position is selected to receive delivery. All contracts that have not been liquidated by the end of the last day of trading must be fulfilled by delivery. On delivery, the long position holder must pay for the commodity by certified check at the most recent settlement price.

Suppose a farmer wanted to deliver against a short position held in the December corn futures contract. The farmer must either acquire elevator space and ship corn to one of several elevators in the Chicago, Toledo, or St. Louis area, or must buy corn that is already in position for delivery. The farmer must also pay for inspection to verify that the corn meets the delivery grade. The notice of intention to deliver must be submitted sometime between the last business day of November and the last business day of December. The farmer would receive payment based on the settlement price on the trading day preceding the issuance of the notice of intent to deliver.

Table 9--Delivery specifications for selected agricultural futures contracts¹

Commodity	Exchange ²	Method of delivery	Grade ³	Delivery locations
Cattle, feeder	CME	Cash settlement	Based on feeder cattle prices reported by USDA's Agricultural Marketing Service	NA
Cattle, live	CME	Live animals ⁴	Choice steers, 1,050-1,200 lbs.	Sioux City, Omaha, Greeley, Dodge City, Amarillo
Cattle, live	MCE	Live animals ⁴	Choice steers, 1,050-1,200 lbs.	Sioux City, Omaha, Greeley, Dodge City, Amarillo
Corn	CBOT	Warehouse receipt ⁵	No. 2 Yellow	Chicago, Toledo, St. Louis
Corn	MCE	Warehouse receipt ⁵	No. 2 Yellow	Chicago, Toledo, St. Louis
Cotton	NYCE	Warehouse receipt ⁵	Strict low-midling, 1-1/16 inch	Galveston, Houston, New Orleans Memphis, Greenville, S.C.
Hogs, live	CME	Live animals	No. 1, 2, 3, or 4 Barrows or gilts	Stockyards in Peoria and other cities ⁶
Hogs, live	MCE	Live animals	No. 1, 2, 3, or 4 Barrows or gilt	Stockyards in Peoria and other cities ⁶
Oats	CBOT	Warehouse receipt ⁵	No. 2 Heavy, No. 1	Chicago, Minneapolis, St. Paul
Oats	MCE	Warehouse receipt ⁵	No. 2 Heavy, No. 1	Chicago, Minneapolis, St. Paul
Orange juice	NYCE	Warehouse receipt ⁵	Grade A ⁷	Florida ⁸
Rice, rough	CRCE	Warehouse receipt ⁵	No. 2, milling yield not	12 counties in east-central Arkansas
Soybeans	CBOT	Warehouse receipt ⁵	No. 2 Yellow	Chicago, Toledo, St. Louis
Soybeans	MCE	Warehouse receipt ⁵	No. 2 Yellow	Chicago, Toledo, St. Louis
Soybean meal	CBOT	Shipping certificate ⁵	48% protein	Arkansas, Illinois, Indiana, Kentucky, Missouri, Ohio, Tennessee, Mississippi
Soybean meal	MCE	Cash settlement ⁵	48% protein	NA
Wheat	CBOT	Warehouse receipt ⁵	No. 2 Soft Red ⁹	Chicago, Toledo, St. Louis
Wheat	MCE	Warehouse receipt ⁵	No.2 Soft Red ⁹	Chicago, Toledo, St. Louis
Wheat	KCBT	Warehouse receipt ⁵	No. 2 Hard Winter	Kansas City
Wheat	MGE	Warehouse receipt ⁵	No. 2 Northern Spring, 13.5% protein or higher	Minneapolis, St. Paul, Duluth
White Wheat	MGE	Shipping certificate ⁵	No. 1 Soft white	Columbia River District

NA = Not applicable.

¹Delivery months are shown in table 3, and size of contract is shown in table 6.

²CBOT=Chicago Board of Trade; CME=Chicago Mercantile Exchange; CRCE=Chicago Rice and Cotton Exchange; KCBT=Kansas City Board of Trade; MCE=MidAmerica Commodity Exchange; MGE=Minneapolis Grain Exchange; and NYCE=New York Cotton Exchange.

³Substitute grades are allowed in most cases.

⁴Uses tenderable and retenderable certificates of delivery, combined with demand notices and reclaims.

⁵The exchange must approve warehouses or plants.

⁶Hogs may be delivered at Omaha, East St. Louis, Sioux City, St. Joseph, Sioux Falls, and St. Paul at designated discounts.

⁷Grade A with Brix value of not less than 57 degrees, having a Brix value-to-acid ratio of not less than 13 to 1 and not more than 19 to 1, with factors of color and flavor each scoring 37 points or higher and 19 for defects, with a minimum score of 94.

⁸Delivery also may be made in Wilmington, Delaware, Elizabeth City, New Jersey, and specified counties in southern California.

⁹Also No. 2 Hard Red Winter, No. 2 Dark Northern Spring, and No. 1 Northern Spring at par.

A Tool for Setting Bounds on Prices

Commodity options offer farmers many competitively priced and secure forward pricing alternatives.

Buying a commodity option establishes the right without obligation to buy or sell a futures contract at a specified price during a specified time interval. Trading in options on agricultural commodities was authorized in 1984, after being banned since 1936. Options are now traded on most agricultural commodities that have active futures trading (table 10).

Options provide farmers alternatives to futures and cash contracts for protecting against unfavorable price outcomes. Hedging with options involves buying price protection with an upfront premium, much like buying insurance. Crop and livestock producers can buy puts to set lower limits on prices for commodities being produced or stored. Livestock feeders can buy calls to set upper limits on prices for feeds to be purchased in the future. Traders who buy and hold options are not subject to margin calls as are futures traders, and the large number of options contracts traded provide

many choices about the type and amount of price protection acquired. With options, as with futures, access to a broker who understands hedging is important. There remains some uncertainty about how the Internal Revenue Service will treat gains and losses from farmers' options positions for tax purposes. Farmers may wish to consult their tax advisor before using such contracts for hedging.

Characteristics of Commodity Options

There are two types of option contracts: puts and calls. A put gives the buyer or holder the right to sell at the specified strike or exercise price until the expiration date. A call gives the holder a similar right to buy at the strike price. The price paid for an option is called the premium. A person who sells an options contract, either a put or a call, is called an options writer or grantor.

Table 10--Farm products and inputs traded on options markets

Commodity ¹	Exchange ²	Contract size	Strike price interval	Average number of contracts traded daily, 1991 ³
Cattle, feeder	CME	44,000 pounds	2¢ per pound	1,000
Cattle, live	CME	40,000 pounds	2¢ per pound	3,000
Corn	CBOT	5,000 bushels	10¢ per bushel	8,000
Cotton	NYCE	50,000 pounds	1¢ per pound	2,000
Hogs, live	CME	40,000 pounds	2¢ per pound	<500
Oats	CBOT	5,000 bushels	10¢ per bushel	<100
Orange juice	NYC	15,000 pounds	5¢ per pound	<300
Pork bellies	CME	40,000 pounds	2¢ per pound	<200
Soybeans	CBOT	5,000 bushels	25¢ per bushel	9,000
Soybeans	MCE	1,000 bushels	25¢ per bushel	<100
Soybean meal	CBOT	100 tons	\$5 per ton	<500
Wheat	CBOT	5,000 bushels	10¢ per bushel	3,000
Wheat	KCBT	5,000 bushels	10¢ per bushel	<400
Wheat	MGE	5,000 bushels	10¢ per bushel	<100

¹Tables 3, 6, and 9 provide information on the futures contracts that are received when these options are exercised.

²CBOT=Chicago Board of Trade; CME=Chicago Mercantile Exchange; CRCE=Chicago Rice and Cotton Exchange; KCBT=Kansas City Board of Trade; MCE=MidAmerica Commodity Exchange; MGE=Minneapolis Grain Exchange; and NYCE=New York Cotton Exchange.

³Number of contracts traded during the year for all options combined, divided by 254, and rounded.

To assure performance on the option contract, the option seller (grantor) must establish and maintain a margin deposit like those required for futures trading. At any time before contract expiration, the option grantor may be required to post additional margin or be allowed to withdraw margin, according to whether the premium has moved against or with the option grantor's position. This provision secures option contracts without tying up large amounts of the option grantor's capital. Option buyers are not required to post margin because they incur no obligations to buy or sell, but instead purchase with their premium payments the rights to buy or sell at a specified price. Most sellers of options are speculators. Option sellers often spread their risks by hedging their options positions with opposite positions in the corresponding futures contract.

By buying and holding options, farmers can set lower or upper bounds on their prices without eliminating the possibility of gaining from a favorable price change. Besides avoiding margin calls, farmers who hedge with options avoid risks of having to buy back contracts at a loss after a crop shortfall. Disadvantages of options include upfront premiums, the inability to assure as high a price net of hedging costs as with futures, and possibly less competitive pricing than with futures.

Opposite and equal transactions can cancel option contracts like they can futures. For example, the buyer of a \$7.00 November soybean put can get out of the market by selling a \$7.00 November soybean put.

An option holder can exercise the option at any time. When an option is exercised, the holder receives a futures position plus a payment reflecting the difference between the strike price of the option and the market price of the futures. For example, a trader who exercises a soybean put option with a \$7.00 strike price when the futures price is \$6.80 receives a short soybean futures position plus 20 cents per bushel. The 20 cents is called the intrinsic value of the option. An option with a positive intrinsic value is said to be "in-the-money." A put option with a strike price above the current futures price is in-the-money, as is a call option with a strike price below the current futures price. Put options with strike prices below the futures price and calls with strike prices above the futures price are "out-of-the-money." They have zero intrinsic value. If an option's strike price equals the futures price, the option is "at-the-money."

In addition to the intrinsic value, an option premium generally includes an additional amount called time

value, which reflects the probabilities that the option might be worth more at some time before it matures. The time value declines to zero as the option approaches expiration. If an option contains time value when a hedger wants to lift a hedge, the hedger can realize a larger return on the option by selling than by exercising. However, it may be better to exercise rather than sell deep-in-the-money options that are near expiration, because the futures market is more liquid than the market for deep-in-the-money options.

How Options Are Traded

Options are traded through the same channels as commodity futures; options trading is permitted only at exchanges approved by the Commodity Futures Trading Commission. Like futures, options are bought and sold on exchange trading floors by open outcry and hand signals. Puts and calls are traded simultaneously in the same pit or ring near where the underlying futures are traded. All trades are reported to and cleared by the clearing corporation, which holds margin deposits from clearing members, handles transfers of funds, and guarantees performance of all contracts.

Puts and calls are traded for each futures contract at five or more strike prices at specified intervals above and below the futures price. Trading is most active at strike prices near the futures price. Options with new strike prices are added when the underlying futures price moves sufficiently to warrant it. This maintains opportunities to trade options with strike prices near the current futures price, but often results in concurrent listings of more than 30 different puts and calls for a single commodity. With so many options contracts available, some may not be actively traded, and selecting the best contract for any given purpose requires considerable care.

The value of an option depends on the current futures price and the perceived price variability of the underlying futures contract. Thus, trading in an option can begin only when trading in the underlying futures contract begins. However, option trading ceases at least 3 to 10 days before delivery on the futures contract begins, to give option holders and grantors time to trade out of any futures contracts they receive when options are exercised and before they would have to make or take delivery on the futures.

Advantages and Disadvantages for Hedging

Decisions about using options depend on the types of uncertainty that a farmer wants to carry or avoid.

The wide range of choices for setting price bounds and the freedom from margin calls that options offer must be weighed against the inability of options to assure as high a net price as futures. Each farmer's decision about using options depends on the types of risks that the farmer wishes to carry or to avoid.

Advantages of Options

Options, like cash and futures contracts, are useful to farmers for reducing price risk, or narrowing the range of probable price outcomes. As with holding futures, holding options cannot be expected to directly raise the farmer's average return, unless the farmer is better than the market at predicting price changes and timing trades. Competition generally assures that options are fairly priced--the premium equals the average return expected from holding the option and exercising or selling it if it matures in-the-money. The major advantages of options, compared with other types of contracts, include:

- *Ability to set lower or upper bounds on prices:* Unlike the hedger in futures, or the holder of a firm price cash contract, the option holder is protected against price changes in one direction, but allowed to gain from price changes in the opposite direction. Thus, for example, put options are well suited for protecting sellers against critically low prices. Suppose that a farmer can grow corn for \$2.30 per bushel, the December corn future is trading at \$2.70 before planting time, and the expected local basis is -\$0.20. The farmer could lock in a price of about \$2.50 by selling the futures. Alternatively, the farmer might assure approximately a \$2.35 return by buying a \$2.60 out-of-the-money put for a \$0.05 per bushel premium ($\$2.60 - 0.20 - 0.05 = 2.35$). If the futures price should fall below \$2.60 by harvest, then the value of the put option at maturity would be \$2.60 minus the futures price and the farmer could sell the option to make up for the lower-than-expected cash price. Alternatively, if the futures price rises above \$2.75, the net return will be higher than if the farmer had hedged in futures.
- *Wide range of choices:* For the knowledgeable hedger, options offer many opportunities to tailor price exposure to particular needs or preferences. Each different strike price can give the option holder a different probability distribution of net price outcomes. The hedger can acquire a small amount of price protection at a low price by buying an out-of-the-money option, or virtually assure the price by buying a deep-in-the-money option. Option contracts can be combined to obtain particular results. For example, the above farmer might buy a \$2.60 put option to assure a minimum price, and at the same time sell a \$2.80 call and use the proceeds to help pay for the put. This would assure the farmer a return within approximately a \$2.40 to \$2.60 range, if basis turns out to be -\$0.20, as expected.
- *Absence of margin calls:* Once the option premium is paid, the option holder has price assurance until the option matures or is sold without any further payment, regardless of how price changes in the meantime. Thus, options are attractive for farmers who can meet the premium payment, but lack access to ready credit for meeting margin calls.
- *Limits on possible losses:* The absence of obligation on the option buyer can be an advantage when output uncertainty is present. Suppose one crop grower has hedged by buying put options, another has hedged by selling futures, and both experience a yield failure that drives up the futures price. The grower who holds put options can simply let the options expire unused, if they are not in-the-money at maturity. This grower's loss on the options market cannot exceed the premium paid. In contrast, the farmer who has hedged by selling futures must buy back the futures contracts at whatever price the market dictates. The loss can be large if the price significantly rises.
- *Pricing competitiveness, contract security, and convenient recontracting:* Options, like futures, are secured by brokerage house and exchange guarantees and are competitively priced on

open markets. One can observe the price daily or more frequently and can change positions on any business day.

Disadvantages of Options

The disadvantages of options include:

- *Inability to assure as high a net price as with futures:* The farmer's average or expected net price, after subtracting options premiums, is the same for hedging with put options as with futures, but the assured price is lower. In other words, the farmer who hedges with options instead of futures accepts a lower assured price in return for the chance to gain from a price increase. For hedging with puts, the assured net price is the strike price adjusted for basis, minus the option premium. When selling futures, the assured price is simply the futures price adjusted for basis. Table 11 shows assured net prices, assuming zero basis, for March corn and December live cattle futures at various strike prices on September 13, 1991.
- *Upfront premiums:* Hedging with options requires paying an option premium when the hedge is entered. A typical premium for an at-the-money option expiring in 6 months would be 5 percent of the value of the commodity. This is roughly the same as the initial margin deposit for a futures position.
- *Difficulty in determining what options are worth:* Another problem with using options is determining what one can afford to pay for the

exercise privileges obtained. Options premiums do not relate directly to cash prices, by way of a basis, as do futures prices. The value of an option depends in a complicated way on the futures price, the strike price, the duration of the option, the interest rate, and futures price volatility. Professional traders rely on computers and experience to analyze these factors and to determine what options are worth. The farmer who uses options infrequently may have to either accept the market price as being competitive or depend on someone else's advice. However, the relatively inactive trading on some option contracts, particularly those that are deep-in-the-money or far out-of-the-money on lightly traded commodities, may occasionally allow prices to get out of line.

- *Basis risk:* When a put option is exercised, the holder receives a corresponding short futures position; when a call is exercised, the holder receives a long futures position. Hedging with options thus exposes one to the same basis variation as does hedging with the underlying futures contract. For example, if the local basis is unusually wide (negative) when a hedge is closed, then a put option, like a short futures position, may not fully compensate the hedger for a decline in the local cash price. In most cases, farmers would close out options positions with offsetting option market trades rather than through exercising, but the basis relative to the futures would affect the farmer's net price in the same way as if the option had been exercised.

Table 11--Corn and cattle prices assured by buying put options, September 13, 1991¹

March corn hedged in puts			December live cattle hedged in puts		
Strike price	Put option premium	Assured net price	Strike price	Put option premium	Assured net price
-----Cents per bushel-----			-----Cents per pound-----		
230	7 $\frac{7}{8}$	229 $\frac{1}{8}$	68	0.37	67.63
240	2 $\frac{1}{2}$	237 $\frac{1}{2}$	70	.62	69.38
250	6 $\frac{1}{8}$	243 $\frac{7}{8}$	72	1.07	70.93
260	12	248	74	1.62	72.38
270	19 $\frac{1}{4}$	250 $\frac{3}{4}$	76	2.70	73.30
280	27 $\frac{3}{4}$	252 $\frac{1}{4}$	78	4.00	74.00
Futures	NA	260 $\frac{3}{4}$	Futures	NA	74.62

NA = Not applicable.

¹Excludes brokerage costs.

Choosing an Option Contract for Hedging

The choice of option contracts for hedging depends on when the commodity being hedged is to be delivered on the spot market, and on the amount the hedger is willing to pay for price protection.

To hedge with commodity options, one must typically choose from some 15 or more different put or call option contracts. These commonly include contracts for 3 or more futures maturity months and at 5 or more different strike prices for each month. The hedger would usually first choose a maturity month to match the date when the actual commodity is to be delivered, and then select a strike price that provides the desired level of price assurance.

Choosing the Maturity Month

Since an option is a right to buy or sell a futures contract, the same criteria apply in selecting the exchange and the maturity month for hedging with options as for hedging with futures. A contract is needed that is close in location and grade to the cash commodity being hedged and that matures soon after the intended date for cash delivery (see "Selecting a Contract for Hedging" in the Futures Contracts section). The choice of maturity dates may be more limited with options than with futures because option contracts for the more distant futures may not be actively traded.

Choosing the Strike Price

The choice of strike price depends on the level of price assurance desired, the amount the hedger is willing to pay for price assurance, and the level of trading activity at the various strike prices. The hedger may sometimes be able to identify a critical price that needs to be assured, such as the price that would cover variable costs, and possibly therefore repay a production loan without penalty.

Options with strike prices near the futures price are the most actively traded. A low-premium out-of-the-money option may protect against the worst price contingencies; a higher premium in-the-money option provides a higher assured price. Deep-in-the-money puts give essentially the same price protection as selling futures gives, but with higher up-front costs and no margin calls. Farmers with limited funds for buying options may find that out-of-the-money options meet their needs.

A Storage Hedge Example

Table 12 presents an example of hedging stored corn with an at-the-money put option. In this example, the May futures price is \$3.00 per bushel when storage begins in October, and the expected basis in May is -\$0.30, giving an expected local cash price in May of \$2.70. The variable costs include \$2.45 for the corn placed in storage, plus 6 months of interest, for a total of \$2.55. Thus, the farmer could assure a \$0.15 return on the fixed investment in the storage bin by selling the May futures. Alternatively, the farmer might buy a \$3.00 at-the-money put option for \$0.13. This would assure a net price of $\$3.00 - \$0.13 - \$0.30 = \2.57 per bushel, giving an assured net return of only \$0.02 on the storage space. However, the options hedge offers the possibility of gaining from a price increase, which compensates for the lower assured net return.

The last two columns in table 12 illustrate two possible outcomes: a price decline where the futures price drops to \$2.75, and a price increase where the futures price increases to \$3.25. Without hedging, the price decline results in a loss of \$0.10 per bushel and the price increase results in a profit of \$0.40 per bushel. A futures hedge would lock in a \$0.15 per bushel return, fully insulating the farmer from the price change. The options hedge only partly insulates the farmer from the price change. With a price decline to \$2.75, the value of the put option in May is \$0.25, which, when combined with the cash price, the storage costs, and the options premium, leaves a return to the fixed resources of \$0.02. For the price increase, the corresponding return for the options hedge is \$0.27.

The important point in this illustration is that holding a put option over the storage interval reduces, but does not eliminate, the variation in net return associated with a given variation in price. Selling futures or buying an in-the-money put option, say one with a strike price of \$3.10 or \$3.20 per bushel, could have further reduced the uncertainty in return. Alternatively, buying an out-of-the-money option, say one with a strike price of \$2.90 per bushel, could have provided a smaller reduction in uncertainty at a lower cost. Thus, the degree of risk reduction depends on which option is held.

A Crop-Growing Hedge Example

Table 13 provides a similar illustration of hedging a growing crop with put options. The presence of yield risk is a major difference here. Because of yield risk,

there is no minimum assured level of return. Even a hedge in futures cannot guarantee a minimum return. However, returns are less variable with futures or options hedging than without.

Table 12--Example of hedging stored corn with put options, October to April

Item	Expectation in October	Outcome in April	
		Price decline	Price increase
<i>Dollars per bushel</i>			
Price of May futures contract	3.00	2.75	3.25
Basis in April	<u>-.30</u>	<u>-.30</u>	<u>-.30</u>
Cash price in April	2.70	2.45	2.95
Cost ¹	<u>-2.55</u>	<u>-2.55</u>	<u>-2.55</u>
Net without hedging	.15	-.10	.40
Premium for \$3.00 put	-.13	-.13	-.13
Value of \$3.00 put in April	<u>.13²</u>	<u>.25</u>	<u>0</u>
Net with put option hedging	.15	.02	.27

¹Costs include price for the corn in November, \$2.45, plus interest for 6 months at 8 percent: $\$2.45 + (6/12) \times 0.08 \times \$2.45 = \$2.55$. Commissions and basis variation are omitted in this example.

²An option's premium in a fair market equals the expected exercise value of the option as it approaches expiration, minus a discount for interest, which is omitted in this illustration. An option that is currently at-the-money can be expected to approach expiration with a positive value about half the time, and expire worthless about half of the time.

Table 13--Example of hedging growing corn with put options

Item and unit	Planting time expectation	Harvesttime outcome	
		Price decline	Price increase
December futures price at harvest, dollars per bushel	2.75	2.45	3.05
Basis at harvest, dollars per bushel	<u>-.30</u>	<u>-.30</u>	<u>-.30</u>
Cash price at harvest, dollars per bushel	2.45	2.15	2.75
Yield, bushels per acre	<u>x 130</u>	<u>x 135</u>	<u>x 125</u>
Gross without hedging, dollars per acre	318.50	290.25	343.75
Production costs, dollars per acre	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>
Net without hedging, dollars per acre	68.50	40.25	93.75
Premium for \$2.70 December put option, dollars per acre ¹	-13.00	-13.00	-13.00
Return on put option, dollars per acre ²	<u>+ 13.00</u>	<u>+ 32.50</u>	<u>0</u>
Net return with hedging, dollars per acre	68.50	59.75	80.75

¹Assumes options purchased to cover 100 percent of expected crop. Estimated cost per acre for options premiums is 130 bushels per acre x \$0.10 per bushel = \$13.00. Commissions and basis variation are omitted in this example.

²The expected value of the option equals the premium. When the futures price declines to \$2.45, the option is worth \$0.25 per bushel x 130 bushels = \$32.50 per acre. The option has no value when the futures exceeds \$2.70.

Forward Pricing Growing Crops

Forward pricing part of a growing crop reduces risk in most cases.

Yield uncertainty makes forward pricing less effective at reducing revenue risks in crop growing than in crop storage. Crop yields and harvesttime prices for farmers located in major producing areas often are inversely related: low prices accompany high yields and high prices accompany low yields. This inverse relationship between price and yield means that only part of a growing crop should be forward priced before yield is assured. If too much of the crop is priced before harvest and the crop then falls short, the farmer may have to buy back contracts at a loss.

Using Forward Prices in Making Crop Growing Decisions

The prices observed prior to planting for harvesttime delivery carry information useful to farmers in making planting and growing decisions. For example, such prices can help growers determine which of two or more crops will probably be most profitable. Futures contracts with harvesttime maturities include December corn, December cotton, November soybeans, July wheat for winter wheat producers, and September wheat for spring wheat producers. The futures price must be adjusted for local basis when used in making production decisions. To use forward price information most effectively, the farmer must actually enter one or more contracts to set the price.

Flexibility to switch between crops or to change levels of inputs is a prerequisite for using forward prices for

making cropping decisions. For example, many corn-soybean, cotton-soybean, and wheat-sorghum producers can vary the mix of these crops depending on profit prospects. Moreover, the profit-maximizing levels of fertilizer and chemical application may change as the prospective price of a crop changes. Early application of herbicides and availability of seed and equipment affect the ability to shift between crops.

Expected net returns above variable costs must be compared to determine which crop is likely to be most profitable. Table 14 illustrates how such comparisons can be made, using corn and soybeans as an example. The futures price, expected basis, prospective yield, and variable costs of production must be known or estimated. Variable costs are the costs for purchased inputs, plus any return that inputs such as family labor could earn in alternative uses. In this example, the expected net return per acre is \$68.50 for corn, compared with \$59.50 for soybeans. Differences in expected net returns of this magnitude suggest that the farmer might wish to plant more corn than soybeans, but maybe not all corn. In choosing the crop mix, the farmer would also need to consider labor and machine availability for planting and harvest and susceptibility to disease. This example is illustrative only. Each farmer needs to use his/her own expected yields, costs, and cash-futures price relationships in making such analyses.

Table 14--Example of using futures prices in making planting decisions for corn and soybeans

Item	Planting-time expectation	
	Corn	Soybeans
Price of harvesttime futures contract at planting, dollars per bushel	2.75	6.00
Expected harvesttime basis, dollars per bushel	<u>-30</u>	<u>-30</u>
Expected local cash price at harvest, dollars per bushel	2.45	5.70
Expected yield, bushels per acre	<u>x 130</u>	<u>x 35</u>
Expected gross revenue, dollars per acre	318.50	199.50
Variable costs, dollars per acre	<u>-250.00</u>	<u>-140.00</u>
Expected net revenue, dollars per acre	68.50	59.50

When To Price Forward

Effective risk management calls for forward pricing as resources are committed to production. In growing crops, this generally implies forward pricing prospective output as production loans are arranged, inputs are priced, and/or output becomes assured. The inputs for growing crops generally are priced in stages. The farmer first buys or rents land and machinery suitable for one or more crops, then each year arranges production loans, buys fertilizer, pesticides, and other inputs, prepares the seedbed, and plants specific crops. The certainty of yield increases gradually over the growing season. This implies forward selling the prospective crop in increments, typically starting at or before planting, and finishing at harvest or when yield becomes assured. A practical solution may be to sell the crop in two or three increments during the year.

How Much To Price Forward

Table 15 illustrates how forward pricing can affect the variability of crop revenues. In this example, the planting-time price of \$2.50 per bushel is the same as the harvesttime price for a normal (130 bushel per acre) crop. A large crop would sell at harvest for \$2.00 per bushel, returning \$290 per acre, and a small crop would sell at \$3.00 and return \$360 per acre. If the farmer forward prices an amount equal to a normal crop, the large crop brings \$355 per acre and the small crop \$295. By forward selling half of a normal crop at planting and selling the remainder at harvest, the revenues are \$322.50 for a large crop and \$327.50 for a small crop, which spans a much smaller range.

The proportion of a farmer's expected crop that should be sold forward to minimize revenue uncertainty depends on how closely revenue (yield x price) is correlated with price alone. For example, if yield were certain, then revenue would vary proportionately with price (except for basis variation), and forward selling almost the entire expected crop would provide the greatest revenue certainty. A widely applicable rule of thumb is to sell not more than a third to a half of the crop at planting time. High yield variability might imply smaller forward sales, particularly in areas where local yields and national yields are closely correlated. Larger forward sales may be justified if multiple peril crop insurance is used, if yields are relatively sure, especially on irrigated land, or if the grower anticipates a price decline. Farmers can make additional sales during the growing season as yields become more certain.

Uncertainty about the cash-futures price relationship may diminish the optimal forward sale when using futures, particularly at locations remote from delivery points and where few local buyers exist. However, the effect of such basis uncertainty on the amount to hedge is generally small compared with the effects of yield risk. Larger amounts can be safely hedged with put options, or sold forward with minimum price contracts, than with futures or fixed-price cash contracts.

Farmers who strongly expect price levels to rise or fall will wish to adjust forward sales accordingly. If price is expected to rise, then less of the expected crop should be sold forward. If price is expected to fall, then forward sales should be larger.

Table 15--Example effects of forward selling on the variability of gross return from corn growing

Item	Harvesttime outcome		
	Normal crop	Large crop	Small crop
Yield, bushels per acre	130	145	120
Harvesttime price, dollars per bushel	2.50	2.00	3.00
Gross return, dollars per acre:			
Sell at harvest	325	290	360
Sell expected crop at planting ¹	325	355	295
Sell 50 percent of expected crop at planting ¹	325	322.50	327.50

¹Assumes that output not priced at planting time is sold at the harvesttime price, or that the amount contracted in excess of production is bought back at the harvesttime price.

Forward Pricing Livestock Feeding and Growing Operations

Forward pricing livestock requires close attention to price relationships.

Forward pricing serves the same purpose in livestock growing and feeding as in crop growing and storage. In each case, the forward price reveals what others think the product will be worth at delivery time. By contracting at the forward price, the farmer reduces or eliminates the chance of having to accept a lower than expected price. Livestock feeding is similar to commodity storage in that it involves buying a commodity, adding to its value, and later selling. In contrast, feeder cattle production has much in common with crop production in that a large portion of the costs typically are fixed costs, particularly for land.

Specifying quality and assuring uniformity are greater problems in livestock contracting than in contracting grains. Moreover, the timing of deliveries is especially critical for livestock. These characteristics require livestock contracts to be designed carefully and make cash contracting an important means for meatpackers to assure timely supplies of the types of animals they need.

Forward Pricing Cattle on Feed

The prices generated on futures markets, combined with estimates of feeding costs and cash-futures price differences (basis), can help feeders predict the profitability of their feeding operations. Many cattle feeders forward price to lock in returns when prices are favorable. Typical cattle feeding periods run 4 to 6 months. Cattle feeders can predict what their finished cattle will be worth by observing the prices of futures due to mature near the end of the feeding period. Cattle feeders can assure price by selling futures, buying put options, or entering a contract with a meatpacker as cattle are placed on feed. The ability

to hedge in futures enables meatpackers to safely offer firm-price cash contracts.

Table 16 illustrates the use of futures prices to forecast the return from cattle feeding. The process involves adding the expected basis (-1 cent) to the current price of the futures contract that matures at the end of the feeding period, and then subtracting feeding costs. In this example, an 80 cents per pound futures price gives an expected profit of 5 cents per pound, but a 75 cents per pound futures price gives a zero expected profit.

Forward selling cannot be expected to increase the average price received for fed cattle, unless the feeder manages to sell prior to price declines. However, forward selling reduces price and revenue uncertainty. A feeder who puts cattle on feed only when forward pricing can assure a satisfactory return may thereby increase average returns over time.

Table 17 illustrates the effects of hedging on the variability of net return from cattle feeding. In this example, a 10-cent decline in price from its expected value of 80 cents results in a loss of 5 cents per pound without hedging, while a 10-cent price increase results in a profit of 15 cents. With hedging, the profit is 5 cents per pound regardless of the price outcome.

Decisions about forward pricing depend on the feeder's business interests, financial situation, risk preferences, and price expectations. For example, a feedlot owner, whose main source of income is cattle feeding, might regularly sell cattle forward as they are placed on feed. The feedlot might be left empty on occasions when the returns that forward pricing could

Table 16--Example use of futures price quotations to forecast returns from feeding cattle from December to May

Item	Case 1	Case 2
<i>Cents per pound</i>		
Price of June live cattle futures contract in December	80	75
Expected basis in May	<u>-1</u>	<u>-1</u>
Expected local cash price in May	79	74
Feeding cost ¹	<u>74</u>	<u>74</u>
Profit	5	0

¹Cost of 74 cents per pound is hypothetical and used for illustration only.

Table 17--Example effects of hedging in futures on the variability of net returns from feeding cattle from December to May

Item	Expectation in December	Realized outcome in May	
		Price decline	Price increase
<i>Cents per pound</i>			
Price of June futures contract in December	80	70	90
Basis in May	<u>-1</u>	<u>-1</u>	<u>-1</u>
Local cash price	79	69	89
Cost ¹	<u>-74</u>	<u>-74</u>	<u>-74</u>
Net without hedging	5	-5	15
Return on futures	<u>0</u>	<u>10</u>	<u>-10</u>
Net return with hedging	5	5	5

¹Cost of 74 cents per pound is hypothetical and used for illustration only.

assure do not cover variable costs. In contrast, the farmer or rancher who is hiring livestock fed in a commercial feedlot, as an extension of the farm business or a form of diversification, may choose to bear the price risk on the feeding operation and not hedge.

Cattle feeders can forward price inputs as well as outputs. For example, by selling live cattle futures and buying feeder cattle futures and corn futures in appropriate amounts, one can approximately lock in returns from cattle feeding well before the cattle enter the feedlot. This enables cattle feeders to sell their feeding services when they think prices are favorable.

Forward Pricing Feeder Cattle

Forward pricing generally is not as effective for reducing price risks in cow-calf operations as in cattle feeding operations. Feeder cattle futures are not actively traded far enough ahead to cover the 15-month or longer time interval from breeding until calves are ready to sell. Consequently, cow culling and breeding decisions must be made before the futures market provides much information about what the prospective calf crop will be worth and before the

calves can be forward priced. Nevertheless, the feeder cattle futures market helps calf producers anticipate prices. If desired, futures contracts can be sold to set approximate prices for calves up to a year before the calves are ready to deliver.

Feeder cattle futures may be particularly useful to farmers and ranchers who buy calves to be raised and sold as feeders. Because feeder cattle differ in value due to grade, location, and sex, the producer must use care in predicting the applicable basis (see "Predicting End-of-Period Basis" in the section on Futures Contracting.)

Forward Pricing Hogs

Hog production requires only about 10 months from breeding to marketing. Consequently, prices of hog futures contracts, which trade a year or more in the future, provide information about what finished hogs will be worth when breeding decisions are being made. The hog producer can, if desired, price the finished hogs at breeding time or at any time during the growing period. Producers may want to forward price something less than their entire prospective hog crop because of uncertainties about litter size and possible losses due to disease.

Adjusting Forward Sales and Purchases for Expected Price Changes

Price expectations may affect the amount of a commodity that a farmer wants to price forward.

Farmers often have opinions about prospective changes in prices of the commodities they produce or buy. For example, a farmer may expect the price of corn for December delivery to rise or fall as harvest approaches. If a price rise is confidently expected, then the farmer might want to wait and sell the crop after harvest. If the price is expected to fall, a larger than normal forward sale may be desirable.

Predicting Price Movements

Farmers have both advantages and disadvantages compared with other traders when it comes to anticipating price changes. Farmers are often the first to observe local weather and yield developments. However, few farmers have the time and expertise to perform thorough price analyses themselves, nor the funds to hire the best professional advice.

Price forecasting methods fall into two categories: fundamental analysis and technical analysis. Fundamental analysis involves identifying and evaluating the factors that affect the supply and demand for a commodity and assessing their effects on price. Fundamental analysis ranges from informal assessment of the effects of the latest news on prices to the use of elaborate statistical models. The information needed for fundamental analysis of agricultural prices includes plantings, weather, numbers of livestock raised or on feed, production, stocks, exports, and general economic conditions. The U.S. Department of Agriculture collects and disseminates much of this information in its crop and livestock production reports (table 18). Additional information sources are discussed in the next section.

Technical analysis involves searching for patterns in price movements that repeat over time. The objective is to recognize a pattern as it begins to develop, and to trade accordingly. The traditional method is to plot the price series on a chart and watch for patterns. Another common approach is to search for trends by comparing the latest price with a moving average of past prices. Computers greatly facilitate the use of technical price forecasting methods. A number of firms sell charts of daily commodity futures prices, and many books on technical analysis are available. However, the usefulness of technical analysis for commodity price forecasting is a subject of continuing

debate. Because many technical price forecasting methods rely on the application of individual judgment, their performance is difficult to evaluate. The wide use of technical analysis by traders may itself introduce patterns in price movements.

Any proposed price forecasting method or trading rule should be examined critically before it is used. Even the best price forecasting methods are likely to be wrong or useless much of the time.

Speculating

Forward markets enable farmers to adjust their exposures to price risk depending on their financial resources, their price forecasting skills, and their views of the market. Some farmers are tempted to use the markets for speculation. Speculation involves buying or selling to profit from anticipated price changes. An example of pure speculation is a farmer's trading in gold futures. A farmer who buys instead of selling a product being grown, in hope of increasing profit from a price rise, is also a pure speculator.

Futures and options markets make speculation very convenient. Such markets allow one to speculate on either price declines or price increases. Positions can be changed quickly and easily, and the amount of margin money needed to get started is relatively small.

However, speculation is risky. To profit from speculation, one must predict price changes more accurately than other traders. Indications are that most speculators lose money.

Selective Forward Pricing--Timing Purchases and Sales

Although few farmers would succeed as pure speculators, many time their sales of farm outputs and purchases of inputs based on anticipated price changes. This is called selective forward pricing or selective hedging. The goal of selective forward pricing is to price outputs (or inputs) at favorable times. This depends on when the commodity will be ready or needed, the costs of carrying or storing it, prospective prices over time, the forward pricing opportunities available, and the risks involved. Gaining from selective forward pricing requires some

Table 18--USDA crop and livestock reports¹

Field crop reports:

Crop Production (monthly, annual summary, and annual Prospective Plantings and Acreage and Winter Wheat and Rye Seedings)
 Crop Progress (weekly, April through November)
 Grain Stocks (quarterly)
 Hop Stocks (March and September)
 Peanut Stocks and Processing (monthly)
 Potatoes (6 issues plus annual)
 Rice Stocks (quarterly)
 Cotton Ginnings (16 issues plus annual)

Fruit, nut, and vegetable reports:

Almonds (annual)
 Celery (monthly)
 Cherry Production (annual)
 Citrus Fruits (annual)
 Cranberries (annual)
 Hazelnut Production (annual)
 Noncitrus Fruits and Nuts (2 issues)
 Pistachio Production (annual)
 Walnut Production (annual)
 Vegetables (monthly, plus annual preliminary and summary)

Livestock reports:

Cattle (2 issues plus monthly Cattle on Feed)
 Hogs and Pigs (quarterly)
 Livestock Slaughter (monthly, plus annual summary)
 Meat Animals: Production, Disposition, and Income annual)
 Sheep and Goats (annual)
 Wool and Mohair (annual)

Poultry reports:

Broiler Hatchery (weekly)
 Egg Products (monthly)
 Eggs, Chickens, and Turkeys (monthly, plus Hatchery Production and Layers and Egg Production, Poultry; Production and Value and Turkeys)
 Turkey Hatchery (monthly)
 Poultry Slaughter (monthly)

Daily reports:

Dairy Products (monthly, plus summary)
 Milk Production (monthly, plus annual Milk Production, Disposition, and Income)

Price and expenditure reports:

Agricultural Prices Monthly (monthly)
 Agricultural Prices Annual (annual)
 Farm Production Expenditures (July and August)
 Crop Values (annual)
 Prices Received, Minnesota-Wisconsin Manufacturing
 Grade Milk (annual)

Other reports:

Agricultural Chemical Usage (March and June)
 Catfish (monthly plus Catfish Production)
 Cold Storage Warehouses (monthly, plus summary and Capacity of Refrigerated)
 Farm Labor (monthly)
 Farm Numbers and Land in Farms (annual)
 Floriculture Crops (annual)
 Honey (annual)
 Mink (annual)
 Mushrooms (annual)
 Trout Production (annual)

¹ These reports are issued by the National Agricultural Statistics Service, U.S. Department of Agriculture. For subscription information call 1-800-999-6779. The reports are also available through a nationwide computer system. For details call (202) 720-5505.

ability to forecast the direction of price changes. The difficulties in forecasting price changes are noted above.

Farmers are sometimes advised to forward sell expected outputs only if and when the forward price covers costs plus a satisfactory profit. Such advice is predicated on the belief that market prices converge toward production costs. However, the convergence of price toward cost is a long-term phenomena that may not occur during any particular production period. Moreover, most of the evidence suggests that futures prices rise and fall with about equal probability. Thus, the farmer who makes production commitments without forward pricing has about a 50-percent chance of having to accept a price that is lower than it was when the commitment was made.

Instead of starting production and hoping that the price will be high enough at some time during the production period to allow selling at a profit, the forward price should be considered at the outset in deciding what and how much to produce (see "Using Information Contained in Futures Prices" in the Futures Contracts section). If the forward price is high enough to justify production or storage, one might start with the idea of forward selling the entire prospective output, or a third to half of the expected output from crop production activities with yield uncertainty. The amount of the forward sale could then be reduced if a price rise is expected, or increased if a price decline is expected.

Information Sources

Government and private sources provide information needed for making contracting decisions.

Farmers obtain much of the information they use in making marketing decisions from radio, television, newspapers, and magazines. Many farm belt radio and television stations report cash and futures prices for agricultural products of local interest several times daily and include data from newly released government and private reports when available. Many newspapers report daily closing futures prices and selected cash prices. However, some farmers need more complete coverage, more convenient access, or more interpretation of the information for specific commodities than what is available through the general media. This section describes other information sources that farmers may wish to use.

Federal-State Market News Reports

The Federal-State Market News Service originates much of the available data on agricultural cash prices and marketings, covering all of the major commodities. Market news reporters collect price quotations by observing trades or talking with buyers and sellers face-to-face or by telephone. For many commodities, price quotations are released to news media daily or at regular times within the day, and printed reports are mailed weekly from market news offices throughout the country. Most of the quoted prices apply to spot or near-term delivery rather than contracts for deferred delivery, although some deferred delivery prices are reported. Radio, television, and newspapers as well as electronic quotation services widely carry the Market News prices. Some farmers may find it worthwhile to subscribe to the printed reports. Information about the Federal-State Market News Service is available from:

Agricultural Marketing Service
U.S. Department of Agriculture
Washington, DC 20250

National Agricultural Statistics Service Reports

USDA's National Agricultural Statistics Service estimates acreage, production, stocks, inventories, and related data for most crops and livestock. Estimates are released throughout the year on prescheduled dates. The news media summarize the most significant statistics in each report. Commodity traders follow these releases closely, and markets often respond to

actual or anticipated information in the reports. The summertime crop estimates are particularly important in the grain and soybean markets. Table 18 on page 37 lists the reports and shows how to order them.

Economic Research Service Situation and Outlook Reports

USDA's Economic Research Service produces situation and outlook reports in a dozen commodity areas, plus reports on exports, income and finance, inputs, trade, and an overall Agricultural Outlook report. These reports combine statistics from various sources with written interpretation to provide readers with background for making production and marketing decisions. The commodity reports are issued regularly, typically three to four times per year. Agricultural Outlook is published monthly. A list of the situation and outlook reports is provided in table 19.

Other Federal Reports

Several other Federal Government reports are of potential interest to farmers. These include weather reports issued by the National Oceanographic and Atmospheric Administration, farm program announcements and participation statistics provided by USDA's Agricultural Stabilization and Conservation Service, foreign sales and trade data reported by USDA's Foreign Agricultural Service, and data regarding interest rates and the general economy provided by the U.S. Department of Commerce and the Federal Reserve Board.

State Extension Services

Most States have extension specialists, located at land-grant universities, who keep abreast of current market conditions for commodities of interest to farmers in the state. Some of the specialists issue newsletters on a regular basis. Many conduct meetings on the situation and outlook during times when farmers are making production and marketing plans. Some conduct workshops on futures trading, options, forward contracting, and other marketing alternatives. Many State experiment stations or extension services offer publications on marketing products important to their State.

Table 19--Situation and outlook reports of the Economic Research Service¹

Title	Release dates
Agricultural Exports	Feb., May, Aug., Nov.
Agricultural Income and Finance	Feb., June, Sept., Dec.
Agricultural Resources:	
Inputs	
Fertilizer, Pesticides, Farm Machinery,	
Energy	Feb., Oct.
Agriculture Land Values and Markets	Apr. (Summary), June
Cropland, Water, and Conservation	Sept.
Agriculture and Trade	
China	July
Developing Economies	Apr.
Pacific Rim	June
USSR	May
Western Europe	Sept.
Aquaculture	March, Sept.
Cotton and Wool	Feb., May, Aug., Nov.
Dairy	Jan., Apr., July, Aug., Oct.
Feed	Feb., May, Aug., Nov.
Fruits and Tree Nuts	Mar., Aug., Sept., Nov.
Livestock and Poultry	Jan., Feb., May, July,
(plus two supplements)	Aug., Nov.
Updates	Monthly
Oil Crops	Jan., Apr., July, Oct.
Rice	Apr., July, Oct.
Sugar and Sweeteners	Mar., June, Sept., Dec.
Tobacco	Apr., June, Sept., Dec.
Vegetables and Specialties	Apr., Aug., Dec.
Wheat	Feb., May, Aug., Nov.

¹For subscription information, write ERS-NASS, 341 Victory Drive, Herndon, VA 22070, or call toll free 1-800-999-6779.

Futures and Options Quotation Services

Farmers can obtain the latest futures and options price quotations from commodity brokerage offices that have electronic quotation machines tied directly to the commodity exchanges. A number of private market information services provide subscribers virtually instantaneous futures and options price quotations for a fee. Some private information services generate printed reports in the subscriber's office covering not only futures but also cash market developments, or provide charts of futures prices and trading activity. Many country buyers subscribe to electronic quotation services that enable them to quote current prices to farmers. Some farmers find it worthwhile to subscribe directly to the quotation services.

Private Reporting and Advisory Services

Private reports and advisory services play an important role in several commodity areas. These include private crop reports, which typically produce

earlier estimates than the USDA, and private price reports for livestock, meats, and eggs.

Several private agricultural advisory services provide regular market letters, toll-free telephone reports, and other reports to their subscribers. Some brokerage houses offer similar services, often with trading suggestions. Some brokerage house account executives are particularly knowledgeable about certain commodity markets. By keeping abreast of day-to-day market developments and using their experience with the markets, account executives can help customers work out hedging plans tailored to the customer's particular needs.

Exchanges and Brokerage Houses

The commodity exchanges publish information booklets concerning futures trading, hedging, and the specific contracts traded. Commodity brokerage houses also distribute information on futures trading, hedging, and the contracts for specific commodities. Many conduct seminars to acquaint potential customers with commodity futures trading.

Suggested Steps

Contracting decisions should be coordinated with other management decisions.

Regardless of the enterprise, whether it is crop production, livestock feeding, or commodity storage, good management requires that contracting and forward pricing decisions be coordinated closely with production and borrowing decisions (see box). These suggested steps provide a general guide, as no single approach is best for every farmer. The choice depends on the individual farmer's resources and objectives.

Identify Production, Borrowing, and Marketing Alternatives

The first step is to identify alternatives, which depend on the resources the farmer controls and the amount that the farmer can borrow. A crop farmer, for example, could grow different crops on the available land, lease more land, lease land to someone else, or even leave land idle. Similarly, the livestock feeder can place different types and weights of livestock on feed, feed to different weights, or leave the feedlot empty. Different levels of cultural practices, fertilizer application, pest control, feeding rates, and so forth, may be possible.

The farmer's borrowing alternatives depend on the amount of collateral owned and on lenders' policies. Alternatives include the amount to borrow and whether to use long-term or short-term loans.

The selling or contracting alternatives include the various outlets and types of cash, futures, and options contracts discussed in this report. Prices that potential buyers bid for cash contracts should be compared with futures prices where possible, using the appropriate basis. If direct use of futures or options is contemplated, then commission fees and margin requirements should be assessed, and lender's policies in covering futures margin calls should be determined.

Estimate Costs and Returns Using Forward Price Information

For farmers with fixed investments in land, equipment, or farming skills, a shortrun goal is to maximize expected returns above variable costs, subject to some restraint on risk. Expected gross returns can be based on futures or cash forward prices. Variable costs, such as purchased feed, fertilizer, and chemicals, for example, are directly tied to production and can be avoided by not producing. In the longrun, the farmer

wants returns to exceed total costs, both fixed and variable. But, profit is maximized or losses minimized in the shortrun by maximizing returns above variable costs.

Certain items that are fixed costs for one producer may be variable costs for another. For example, depreciation, interest, insurance, and taxes on a feedlot are fixed costs for the feedlot owner--they are realized whether the feedlot is used or not. However, the costs for these feedlot services are variable costs for the farmer who is hiring cattle custom fed in a feedlot.

Evaluate Risk and Risk-Bearing Capacity

Among the risks that a farmer must weight are price risks, output risks, and risks of contract default by opposite parties. In past years, Government nonrecourse loans and deficiency payments effectively limited downward price risks for growers of program-supported commodities. The farmer who was eligible for loans and deficiency payments often needed no other price protection. Price risk has become more important with lower loan rates and target prices, and other farm program changes.

All crop producers face output risk, but the risks are particularly great in nonirrigated areas that are subject to frequent droughts. Crop yield risk includes not only the possibility of low yields but also poor quality; for example, high-moisture corn, weak-fiber cotton, or undersized potatoes. Diversification among enterprises, crop yield insurance, and holding of reserve funds to carry the farm through 1 or more bad crop years are the primary ways to deal with crop yield risk. In many crop-growing situations, forward selling no more than a third or half of the expected crop before yield is assured minimizes risk.

Farmers who enter cash contracts must also consider the possibility of default by buyers; farmers who use futures and options contracts must evaluate their basis risks, and farmers who hedge with futures must weigh the risks of margin calls. Dealing only with reputable buyers and sellers can limit default risk. Basis risk is relatively small for most producers, but may be substantial for farmers who are distant from futures delivery points or who produce commodities with special quality attributes. To be prepared for

futures margin calls, the farmer must either hold cash reserves or make arrangements with a lender.

Farmers differ greatly in the amount of risk they can tolerate in an enterprise, depending on their overall debt-to-asset situation, their degree of diversification, and the riskiness of their other enterprises. One large loss, or two or three successive smaller losses could throw into bankruptcy a specialized farmer with a high ratio of debts to assets. Such a farmer would want to make full use of forward sales, option contracts, yield insurance, and other precautions to assure some minimum level of return. In contrast, a farmer with substantial financial reserves or other sources of income may choose to carry greater risks on a particular enterprise in hopes of achieving higher average returns over time. However, even the more financially secure farmer can use forward contracts or options to expand profit opportunities while controlling risks.

Plan Borrowing, Production, and Marketing Activities

Once alternatives have been identified, costs and returns have been estimated, and risks evaluated, a coordinated plan for borrowing, production, and marketing can be developed. The plan needs to allow for the possibility of unfavorable contingencies, such as lower than expected prices or yields. A sound plan can also help in obtaining loans.

Implementation

Implementation involves first arranging loans, buying inputs, and contracting for outputs, and then carrying out the physical processes of production and marketing. Changes in yield and price prospects after implementation begins may require modifying the

plan. For example, the amount of a crop that is forward priced can be adjusted upward or downward as yield prospects improve or decline.

Steps in Farm Decisionmaking

Planning stage

1. Identify the production, borrowing, contracting, and spot-selling alternatives available.
2. Estimate costs and returns using forward price information.
3. Evaluate risks and risk-bearing capacity.
4. Plan borrowing, production, and marketing activities.

Implementation stage

1. Arrange loans, purchase inputs, and contract outputs.
2. Initiate and carry out production or storage.
3. Adjust to new information about price and yield prospects as needed.
4. Deliver the product, close out any futures or options hedges, and repay loans.

Glossary

Basis - The difference between a spot price for a commodity and the price of the nearest futures contract for the same or a related commodity.

Call option - A contract that gives the holder a right, but not an obligation, to buy a futures contract at a specified price over a specified time interval.

Cash contract - An agreement negotiated individually between a buyer and seller without the guarantee of an organized exchange.

Clearinghouse - An adjunct to, or division of, a commodity futures exchange that settles trades, guarantees contracts, and oversees delivery procedures.

Commodity exchange - A formal organization with voting members that operates under a set of bylaws and promotes trade in one or more commodities by providing services and rules for conducting trade.

Commodity Futures Trading Commission - The Federal agency empowered to regulate futures trading.

Contract - An agreement between two parties that defines rights and obligations to deliver and to pay for a designated commodity or service on a designated future date.

Deferred pricing - Agreeing to determine price by formula at a later date.

Delayed pricing - A type of deferred pricing that allows transfer of title before the price is determined.

Delivery month - The specified month within which a futures contract matures and can be settled by delivery.

Delivery point - A location where a commodity may be delivered to fulfill a futures contract.

Forward pricing - Agreeing on price for later delivery.

Futures contract - A standardized contract for deferred delivery traded under the bylaws of an organized commodity exchange.

Hedging - Taking a futures position opposite to a cash position to reduce overall exposure to price variation; a purchase or sale of futures as a temporary substitute for a cash transaction that will occur later.

In-the-money - An option contract that has a positive value if exercised. For a call option, this occurs when the market price exceeds the strike price. For a put option, this occurs when the market price is below the strike price.

Long - A person who owns a commodity or other asset or holds a fixed-price contract to buy a commodity or asset.

Margin - Required money or collateral that a customer deposits with a broker, or a broker deposits with the clearinghouse, to ensure fulfillment of obligations under a futures contract.

Maturing future - A futures contract during the last few weeks of trading before delivery or cash settlement is required.

Open position - A contract, especially a futures contract, that has not been offset, or fulfilled by delivery.

Option contract - A contract purchased for an agreed sum of money, known as a premium, that gives a buyer the right, but not the obligation, to sell (or to buy) an asset at a stipulated price.

Option grantor (writer) - A person who sells an option contract, receives the premium, and bears the obligation to buy (or sell) the asset at the strike price.

Option premium - The amount an option buyer pays the option grantor for an option contract.

Put option - An option contract that gives the buyer a right, but not an obligation, to sell a futures contract at a specified price.

Short - A person who holds a fixed-price contract to sell a commodity or other asset.

Speculation - Holding an asset or a fixed-price forward contract to buy or sell an asset, with the objective of profiting from price changes.

Squeeze - A futures market situation in which one or more traders threaten to stand for (or make) such large deliveries that opposite traders are forced to buy (or sell) at a distorted price to avoid delivery.

Strike price - The stipulated price at which a put or call option contract may be exercised.

**U.S. Department of Agriculture
Economic Research Service
1301 New York Avenue, NW.
Washington, DC 20005-4788**

